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Anatomy — anomalies

Man

APICAL PERICARDIAL ADHESION RESEMBLING THE REPTILIAN GUBERNACULUM CORDIS

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ONE PLATE (THREE FIGURES)

THE CASE

The gubernaculum cordis is familiar as a fibrous band covered with serous membrane which attaches the apex of the heart to the pericardium in turtles and crocodiles. It is considered to represent survival of a portion of the ventral mesocardium (Kingsley, '17). There is no record of the persistence of the mesocardia in man and it has become accepted as a mammalian peculiarity that no ventral mesocardium appears in this class because coalescence of primordial coelomic spaces creates a complete cavity beneath the cardiogenic plate before the heart begins to differentiate (Arey, '40). The following case is reported because of its striking resemblance to the reptilian structure and the interest of its probable pathologic origin. The author was not able to find similar examples in the literature.

Subject. The anomaly shown in figures 1, 2 and 3 was found in the course of routine dissection in this laboratory on October 30, 1935. It was immediately photographed in situ and careful descriptive notes were made. The cadaver was a male Negro (H.U. 71), stated to have been 71 years old, an age compatible with the condition of the skeleton, and a chauffeur by occupation. Pulmonary tuberculosis was the cause of death.

Band. The apex of the heart was joined to the mediastinal pericardium at its junction with the diaphragmatic portion by a broad, flat band of what appeared to be muscular fibers invested with a serous covering continuous above with visceral and below with parietal pericardium (figs. 1, 2). There was no evidence of current inflammatory process or exudate in the pericardial cavity or sac.

The band was 21 mm. broad at its cardiac attachment and 13 mm. broad at its pericardial end. It extended from above downward, forward and lateralward at an angle of about 42° with the midline. The medial border of the band was 22 mm. in length and the lateral border 26 mm. Shortest distance between cardiac and pericardial attachments was 19 mm. on the costal (ventral) surface; greatest distance 48 mm. on

the phrenic (dorsal) surface. Thickness of the band was fairly uniform and measured 4 mm. near its cardiac end. The direction of the strands from heart to pericardium was nearly parallel to the surface of the mediastinal sac. Consequently, the costal surface of the band blended with the pericardium higher than the phrenic surface and was shorter than the latter.

The anterior descending branch of the left coronary artery with the great cardiac vein curved on to the diaphragmatic surface of the heart at the medial border of the band, some of the fibers of the latter apparently passing beneath the vessels. Cardiac attachment specifically to the left ventricle was thus delimited.

Microscopic examination of a longitudinal segment of the band by Dr. R. L. McKinney did not reveal muscular fibers within it.

Heart. The heart itself was small. The apex lay 15 mm. lateral to the left border of the sternum in the fifth interspace. The right border of the heart at furthest projection was 25 mm. beyond the right border of the sternum. Transverse breadth of the organ in situ was 81 mm. and vertical height 103 mm. Lateral displacement to the right was presumably a result of fluid in the lower left chest. Slight coronary sclerosis was grossly apparent.

When the pericardial sac was opened, the diaphragmatic surface of the heart did not rest upon the parietal pericardium, but was separated from the latter by a space of about 19 mm.

Lungs and pleurae. The lower left chest presented a large pleural cavity which apparently had been filled with fluid, as much caseous matter was found in its dorsal recess. This open pleural space ended above in the fifth interspace just lateral to the mid-clavicular line. Costal and mediastinal pleurae were much thickened.

The left lung had been markedly compressed or collapsed below and was 45 mm. from the chest wall in the mid-axillary line at the level of the seventh interspace.

The upper lobe of the left lung was merely a shell for an enormous multilocular cavity. A large cone-shaped cavity 40 mm. in depth in the upper dorsal portion of the lower lobe had its base directly adherent to the chest wall. Additional cavities were present in the left lower lobe.

No cavitation was present in the right lung but nodules apparently tuberculous were present in each lobe.

DISCUSSION

The well developed condition of the gubernaculum cordis in the Chelonia and Crocodilia has been long known (Owen, 1866) and well

illustrated (Fabian, '13; O'Donaghue, '18; Abbott, '36). It appears to be an anchoring device and in the physiological laboratory has proven a great convenience for the attachment of hooks or clamps by which the heart might be manipulated. Its ventral mesocardial origin seems uncontested.

The location, form and serous investment of the present structure presented sufficient resemblance to the reptilian gubernaculum to require the possibility of similar origin to be critically examined. Old text-figures of a human ventral mesocardium still used (Prentiss and Arey, '23; Arey, '40) indicate how such an origin might be postulated. The evidence presented, however, by those investigators who have affirmed that a ventral mesocardium is not formed in mammals and particularly in man (Robinson, '03; Rouvière, '04; Yoshinaga, '21; Davis, '27), seems so clear that a developmental origin for the condition in our specimen must be considered an extremely remote possibility, if it may not be dismissed entirely. It should be mentioned though, that if two of the primordial coelomic spaces from which the pericardial cavity is formed, should fail to coalesce under that portion of the cardiogenic plate which would develop into the apex of the heart, but simply remain in juxtaposition, a septum would result which might give rise to the band in our case.

A pathological explanation is more plausible. In view of the size of the band and the fact of its coverage with serous membrane, it might be assumed to be an old apical pericardial adhesion which in the course of time became stretched and developed to present dimensions by cardiac contraction.

In the absence of clinical history the most obvious possible cause of such an adhesion would be extension of the tuberculous process in the left lung which had attained massive proportions at death.

SUMMARY AND CONCLUSION

A serous-covered fibrous band uniting the apex of the heart to the pericardium in an aged male has been described and its resemblance to the gubernaculum cordis of certain reptiles indicated. After consideration of factors involved in postulating either developmental or pathological origin, it was concluded that the structure is the result of an old pericardial adhesion which became stretched and expanded by cardiac contraction. The adhesion itself appeared to have been caused by extension of tuberculous pathology in the adjacent lung. The writer is grateful to his colleague in pathology, Dr. Robert S. Jason, for a critical reading of this report.

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PLATE 1

EXPLANATION OF FIGURES

- 1 Heart in situ from in front. The pericardial sac has been opened and retracted showing costal surface of the apical band attaching heart to pericardium.
- 2 Diaphragmatic surface of heart showing phrenic surface of band. The continuity of the serous coat of the band with that of visceral pericardium above and parietal pericardium below is clearly shown. Band fully extended.
- 3 Same view as figure 2. Tension on band relaxed so as to show higher blending of costal than phrenic surface with pericardium.

