

DEXTROCARDIA: A REPORT OF SIX CASES, FOUR PRESENTING PULMONARY COMPLICATIONS, TWO OF WHICH PRESENT MARKED BRONCHIECTASIS.

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Dextrocardia may be the only transposition in a given case, other organs such as the liver and spleen may be transposed or a complete mirror image of all the viscera may occur, *situs inversus*. Many instances of *situs inversus* are reported in the literature, particularly during the past twenty-five years.

It is interesting that most of the cases in the earlier literature were discovered upon the operating or autopsy table, whereas since the X-ray has been extensively used in chest diagnosis, most of the cases are discovered by this means.

Although there have been numerous reported cases in the literature, still the incidence of occurrence is low. In 1902 Arneill¹ states that "Perhaps something like 300 have been reported in the literature." According to Lewald² it occurs once in 5000 autopsies, once in 35,000 examinations of recruits and about 29 times in 40,000, or 1 in 1724 X-ray examinations of chest and abdomen. Bland Sutton³ encountered it once in 3000 abdominal sections. Doolittle⁴ quotes Blodgett as reporting two cases found in examining 20,000 German recruits.

It is supposed to occur twice as often in males as in females and has been discovered more frequently in the young than in adults.

Instances of complete *situs inversus* in brothers are reported by Leroux, Labbe and Berret,⁵ Reid,⁶ and the condition is reported in a nine-year-old Hebrew boy and also in the maternal grandfather by Randolph and Thomas.⁷

There seems to be considerable controversy among embryologists as to the causation of *situs inversus*, therefore no attempt is made in this paper to discuss the possible etiology. However, Horatio Hackett Newman⁸ makes an observation which does seem to have a definite

bearing on the possible occurrence of pulmonary disease in situs inversus, as follows:

“Not only are there numerous instances of situs inversus in conjoined twins, but, according to Spaeth and Schatz, small deviations from the normal situation are often found in separate one-egg twins. Such deviations do not so much concern the larger, more obvious organs such as the stomach, heart, aorta, but have to do especially with less conspicuous regions of the circulatory system.”

Malformation of the lungs, showing absence of one or more lobes, has been reported by Garrod and Longmeade,⁹ Doolittle,⁷ Carmach¹⁰ and others.

Gleish¹¹ reports a case of right lower lobar pneumonia complicated by massive atelectasis in a seven-year-old colored child, having situs inversus.

Lichtman¹² in a recent review of isolated dextrocardia, finds 32 cases out of a total of 161 having a history of some extracardiac thoracic disease, pleurisy, pulmonary tuberculosis, pneumonia or pericarditis. He reports an additional case¹³ having a questionable bronchiectasis of both bases.

Five cases of situs inversus and one of isolated dextrocardia have been encountered in the Rochester General Hospital during the past six years and because the condition itself is infrequent, but particularly because pulmonary disease occurred in four of the cases, they are herewith reported:

CASE 1. SITUS INVERSUS.

Private service of Dr. George Gelser.

Name: B. G. R.

Age: 28.

Married, no children.

Admitted to the Rochester General Hospital for a slight pelvic operation, August 1, 1928. Discharged August 4, 1928.

Family history: Unimportant.

Past History: Pneumonia at 2, 19 and 22 years of age.

Present Illness: Electrocardiogram and an X-ray study of the chest and abdomen showed a complete situs inversus.

Recent inquiry reveals the fact that she has had no illness since being discharged from the hospital in 1928.

CASE II. SITUS INVERSUS WITH CONGENITAL HEART DISEASE.

Name: C. C.

Age: 13, white, school child.

Admitted to the Medical O. P. D., April 10, 1926.

Diagnosis: Congenital heart disease, mitral regurgitation and stenosis with cardiac hypertrophy and patent interventricular septum, situs inversus.

Family History: Unimportant.

Past History: Was a blue baby and has been somewhat cyanosed all her life. Had whooping cough at one year of age with good recovery and three weeks prior to admission had attack of grip, following which she lost appetite, became markedly dyspneic, even when in bed, no orthopnea, no edema of ankles.

Chief Complaint: Cough, dyspnea, loss of appetite.

Physical Examination: Small, slender, Italian girl, with purplish lips and telangiectases on cheeks, very marked clubbing of fingers, veins over the face distended and blue, bluish tinge to cheeks and nose, mucous membrane of the mouth bluish in color.

Tonsils: Small, throat not inflamed.

Teeth: Badly decayed.

Neck: No palpable glands in neck.

Chest: Poorly developed. Lungs: Breath sounds clear, no râles.

Heart: Apex beat 10 cms. to the the right of the MSL. Dullness extends from the second interspace to the costal margin below. Distinct palpable thrill and palpable murmur and rub felt over the apex. There is a loud systolic murmur in the third right, replacing the first sound, transmitted to the left and upward toward the neck. Rate regular, pulmonic second louder than aortic.

Abdomen: The liver is felt on the left and the spleen not palpable.

Urine: Three plus albumin, hyaline and granular casts.

X-ray study showed dextrocardia and transposition of the abdominal organs, the cecum with a partially filled appendix seen in the left lower quadrant. Electrocardiogram showed congenital dextrocardia with right ventricular preponderance; two to one, auriculoventricular heart block.

CASE III. SITUS INVERSUS, CONGENITAL LUES, GUMMA OF SPLEEN.
LEFT HYDROTHORAX.

Name: C. K. Age: 25. Single. Born in Germany.

Referred by Dr. M. R. Fishbein to the Rochester General O. P. D., April 19, 1928. Discharged, May 28, 1928.

Chief Complaints: Swelling of legs, palpitation of heart and shortness of breath. Amenorrhoea seven months.

Family History: Unimportant.

Past History: Tonsillitis every year since childhood. Teeth bled lately when brushed. Pneumonia in 1921, good recovery. As long as patient can remember, has had nocturia each night once. Menses began at 13, every 28 days, flowed 4-5 days. For the past two years has noticed that the flow lasted only two days. Has had no flow whatever since crossing the Atlantic seven months ago. Three years ago had attack of rheumatism "in shoulders and knees." Has been losing weight for the past seven months.

Present Illness: During the past two years has noticed palpitation of heart on exertion: feet and legs have been swollen in the evening. Six days ago the right leg became tender, both legs being more swollen now than ever before.

Physical Examination: Eyes, ears and nose normal. Pharynx: Negative. Gums bleed at margin. Anterior cervical glands palpable, inguinal glands also palpable. Chest: Movement impaired on the left side. Dull in left lower posteriorly and in axilla. Breath sounds clear, except for râles posteriorly in bases, more in the right.

Heart: Apex palpable in the first interspace on the right, 13 cms. to the right of the MSL, 5 cms. to the left of the MSL. Soft blowing systolic murmur heard on the right.

Abdomen: The upper abdomen is prominent, the edge of the liver is easily felt below the costal margin on the left. On the right there is a mass under the eighth, ninth, tenth, eleventh ribs, reaching nearly to the umbilicus and downward to the crest of the ilium. Distinct notch felt in the lower border, but was otherwise smooth. This was diagnosed as an enlarged spleen. Also a rounded mass found in the epigastrium, reaching from under the syphoid. It is distinct from the spleen, but may be attached to the liver. No tenderness in the abdomen.

Both legs edematous below the knee and the right is tender.
 Temperature 98 to 101 daily, in the morning. Pulse 80—100.
 Urine: Normal.

Blood Count: Red: 3,700,000. White: 6000. Neut.: 69%.
 Lym.: 26%. Eosin.: 2%. Bas.: 1%. M. T. 2%.

Progress: Repeated aspirations, left chest, 100—1250 c.c.; no organisms in fluid, no tumor cells.

O. T. Negative.

Wassermann: Negative—later four plus.

Diagnosis: Congenital lues.

Since discharge from hospital and antiluetic treatment, the liver and spleen have returned to normal size. There has been no recurrence of the effusion in the left chest and general condition has been excellent. Has had no illness with the exception of an acute appendicitis, for which she was operated on, the appendix being found in the left lower quadrant.

No electrocardiogram. X-ray showed complete situs inversus.

CASE IV. SITUS INVERSUS—CHRONIC LOWER LOBE BRONCHITIS.

Name: A. S.

Age: 8 years. Italian girl.

First Seen: November 8, 1929, Rochester General Hospital
 O. P. D., Chest Clinic.

Family History: Unimportant.

Past History: No history of acute infections, except for two or three colds each winter.

Present Illness: Following acute respiratory infection three months ago, developed chronic cough, unproductive.

Physical Examination: Nose and throat normal. No cervical adenitis.

Heart: Apex beat 4 cms. to the right of the sternum, fourth interspace, no murmur.

Lungs: Many coarse râles left lower lobe posteriorly.

X-ray: Showed dextrocardia and after lipiodol study, bronchi normal in size and shape.

No electrocardiogram made.

CASE V. ISOLATED DEXTROCARDIA WITH PAN SINUSITIS
AND BILATERAL BRONCHIECTASIS.

Name: E. A. S.

Age: 31. Married, no children.

First seen August 18, 1927, Chest Clinic, Rochester General Hospital.

Family History: Unimportant.

Past History: At two years of age had whooping cough, since which time has had a chronic, productive cough, many persistent colds, more severe during the cold weather. Since childhood has had severe coughing attack each morning, frequently causing vomiting. Sputum has gradually increased in amount until at present raises a half cup of foul tasting and smelling sputum about three times daily. One month ago noticed blood streaks in the sputum, which decided her to come to the Clinic. Chief complaints, cough with a large amount of foul sputum. Blood streaks in sputum.

Physical Examination: There was a marked muco-purulent secretion both sides of the nose with a good deal of postnasal secretion present.

No enlarged cervical glands.

Chest well developed, quite thin and is markedly dull from the seventh v.s. to the base in both sides. There are many râles throughout both sides on deep breathing and after cough râles in the upper half, more numerous and larger râles in the lower half. Breath sounds almost obscured by râles in the lower half of both chests after cough.

Heart: Measures 3.75 cms. on the left, 7 cms. to the right, no murmur, no arrhythmia.

Blood Pressure: 118/72.

X-ray Study: Showed dextrocardia, extensive bilateral bronchiectasis.

Abdomen: Normal, apparently the liver being situated on the right.

Electrocardiogram showed congenital dextrocardia, sinus tachycardia and sinus arrhythmia.

The X-ray of the sinuses showed a polypoid pan-sinusitis.

CASE VI. SITUS INVERSUS, CHRONIC MAXILLARY SINUSITIS,
BILATERAL BRONCHIECTASIS.

Name: H. C.

Private service of Dr. John J. Lloyd.

Age: 32. Married, no children.

Family History: Unimportant.

Past History: Coryza frequently in childhood, at 16 developed bronchial trouble, cough and sputum severe. Scarlet fever at 11, following which hearing was impaired. Good deal of trouble with nose, necessitating several operations. Diagnosed as bronchiectasis.

Present Illness: Chief complaints are cough and sputum, raises about one cup thick, heavy sputum in 24 hours. Very short of breath on exertion, tires very easily.

Fingers markedly clubbed since 16 years of age.

Chest: Heart 3 cms. to left of MSL and 5 cms. to right of MSL. No thrill, no murmur.

Lungs: Dull both bases posteriorly with many large râles on deep breathing and after cough below the fifth v.s. on each side.

Blood Count: 10,300 white cells, otherwise normal.

X-ray: Showed dextrocardia and after lipiodol study, extensive bronchiectasis involving the lower trunks on both sides.

Abdomen: The stomach was situated on the right and liver on the left—spleen not palpable on right.

Electrocardiogram: Showed congenital dextrocardia.

Case five is an instance of isolated dextrocardia, the other five cases all being complete situs inversus.

As will be noted, only one of these six cases occurred in a male. None of the six were left-handed nor was there the history of twins in any of the families represented.

When we consider that the embryologists constantly find "deviations from the normal in the less conspicuous regions of the circulation" and that many malformations of the gross lung structure have been described in cases of situs inversus, does it not seem probable that there may be other malformations present involving the smaller structures such as the bronchi? The occurrence of two adult cases with well-established bronchiectasis and a child with chronic bronchitis in a series of six cases of situs inversus is, to say the least, unusual.

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DISCUSSION.

PRESIDENT HAMMAN: Dr. Lloyd was unable to come to the meeting, but he sent his paper to Dr. King, and Dr. King has very kindly consented briefly to give Dr. Lloyd's paper, and then to make his own comments upon it.

DR. JOHN T. KING, JR.: I shall now emulate the Lord High Chancellor and, speaking in my capacity as discussor of this paper, address myself in my capacity as deliverer of the paper, and I might say to myself that of course the evidence presented here is purely circumstantial. There is no autopsy report and no histological study of the lungs. I think Dr. Lloyd might have argued by analogy from the cardiovascular system. It is not true, of course, that any congenital defect in the cardiovascular system either in the heart or in the aorta is very liable to secondary bacterial invasion, which is not infrequently fatal. So if one could argue in this way there would seem no reason why, if there did occur

congenital changes in the finer structures of the lung, such a secondary bacterial invasion might have more chance to occur than would be the case with strictly normal lungs.

Now he is careful to point out that he did not consider these bronchiectases strictly congenital, but possibly having been set up by the sinus infection in lungs that might, on the basis of congenital peculiarities, be peculiarly or particularly liable to develop such conditions.

I have nothing to add particularly to Dr. Lloyd's paper except to show a few slides of one case that I picked up in my practice about a year ago. (Slide.) This was a young American. The right side is away from us, and you will see that most of the heart in this case is in the right side of the chest. This is his diaphragm on the left side and is filled by the stomach. When the dome of this area here was projected to the chest wall it was found to be two fingers above the level of the lymph nodes on the left side.

(Slide.) He was given barium, and this again is the left side. You will see there the stomach pouch extending away up into the left side of the chest, and this undoubtedly had something to do with the displacement of the heart to the wrong side of the chest. This is all stomach. The esophagus was on the right side. Barium came down here, and the pylorus is on the under surface of the stomach.

(Slide.) This is the electrocardiogram of this patient. You can't see the R-waves very well, but they extend here in the first lead, to here in the second, and here in the third. There is not only no mirror image present, but there is no predominance of one ventriculogram over the other; in fact there is nothing in the tracing especially of auricular fibrillation, so I think one would take this as an instance of pure transposition of the heart rather than a mirror image inversion of the heart associated with multiple congenital defects and rather than a pure type of complete situs inversus.

Now I shall resume my position as reader of the paper and proceed to defend Dr. Lloyd's paper against any and all inquiries. (Laughter.)