

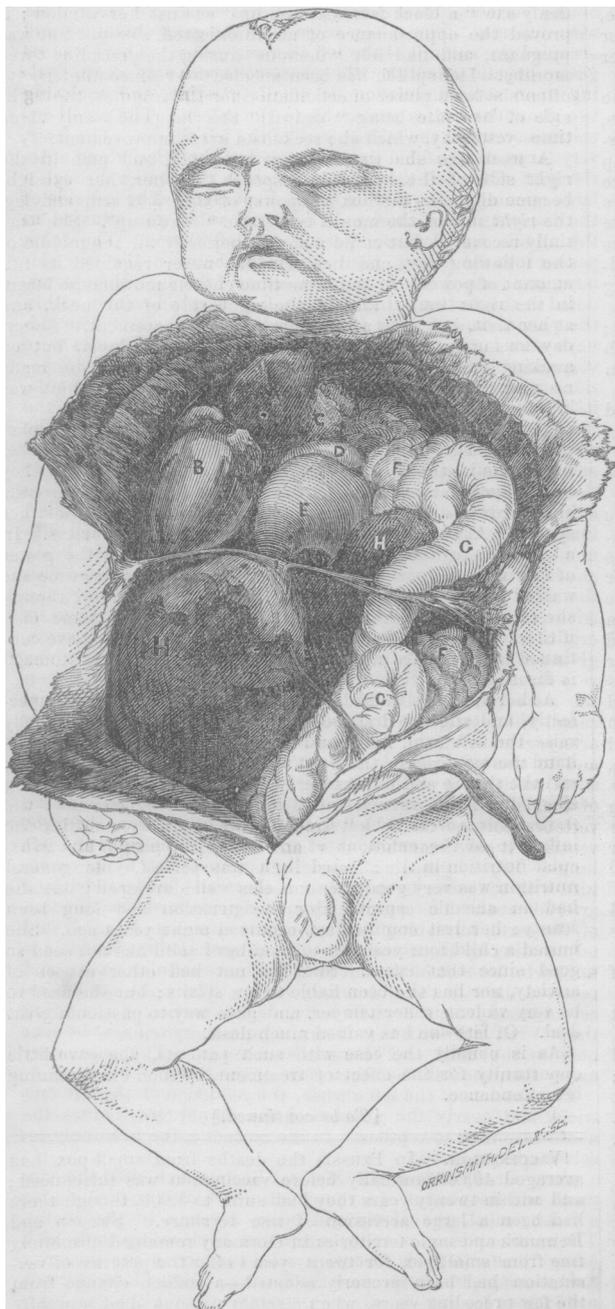
Original Communications.

CONGENITAL DEFICIENCY OF THE DIAPHRAGM: MALPOSITION OF THE VISCERA.

By THOMAS ROBINSON, M.D.

THE few records we have of cases of congenital deficiency of the diaphragm, may render the following interesting.

Mrs. M. was delivered of a male child on February 8th, 1860, apparently at the full period of gestation. The child, when born, was of blue aspect, which soon became intense. It lived only a few minutes, and made during life ineffectual efforts to breathe: but without heaving movements of the chest, which was particularly observed. From examination



A. Thymus Gland. B. Heart. C. Left Lung. D. Spleen. E. Stomach.
F. Small Intestine. G. Large Intestine. H. Liver. I. Diaphragm.

during life, it was noticed that percussion was dull over the whole thorax; the heart's pulsation was not felt; the abdomen felt hard, full, and resisting; there was no evacuation of meconium.

AUTOPSY forty hours after death, witnessed by Dr. Cockle. The body was intensely cyanosed. Anteriorly, the thymus (A) and heart (B) occupied the right side of the thorax. The pericardium being opened, the heart's apex pointed to the left side; the vessels were normally arranged. On drawing the heart forwards, a small lung, in an unexpanded foetal condition, was seen, occupying the space corresponding to the angles of the ribs and vertebral column of the right side. The left side from the clavicle to the half chest was occupied by the small intestines (F); in juxtaposition with these lay the spleen (D), which was in contact with the thymus gland with its right border, separated below by a rudimentary left lung (C)—a thin triangular shaped body scarcely measuring an inch in its longest direction. The lower half of the left chest cavity was filled by the left lobe of the liver (H), the stomach (E), and other parts of intestines; the latter being to the left, the liver next, and the stomach adjacent to the pericardium and below the spleen. The diaphragm (I) was deficient of the left tendinous part, admitting part of the left lobe of the liver and other viscera mentioned, through the space. The left crus was present, and formed a pillar, round which the œsophagus curved to rise to the stomach. The greater curvature of the stomach was superior. The right half of the diaphragm was normal. The right lobe of the liver (H) was large; and, with the kidney, occupied entirely the right side of the abdomen. The left side was filled by intestines and kidney, the colon (G) being wholly on the left side, ascending on that side of the spine into the thorax. There was no other malformation or displacement.

Comparison with the lower vertebrata shows with tolerable clearness that this was a case of arrest of development of the diaphragm; this muscle being developed from circumference to centre, and not existing in the early life of the human foetus, the condition permanent in birds, reptiles, and fishes. The cetaceous and amphibious mammalia have an imperfect diaphragm, approximating that of birds, which consists of bands of muscular fibres passing from the ribs to the pleura. In the porpoise there is no central tendon; resembling early life in the human foetus and some cases of congenital deficiency. Fishes have a muscular septum between the branchial apparatus and abdomen. The true mammalia alone have a genuine diaphragm.

For the proper appreciation of this malformation, and for the convenience of those interested, I have collected the following cases.

i. Geoffroy St. Hilaire quotes a case from Martin St. Ange, "where the diaphragm was deficient on the right side; the stomach, small intestines, and considerable portion of right lobe of liver, had passed into the thorax, which they filled in great part. The abnormal opening of the diaphragm, by means of which the communication was established between the two great splanchnic cavities, was of rounded form, and situated on the right side; a circumstance which it is important carefully to bear in mind, because it refutes an error of importance in a theoretical sense, and which might entail serious practical results. Indeed, skilful surgeons have extended to congenital hernial displacements the results of observations made upon accidental herniæ resulting after birth; *i.e.*, at a period when all the organs have attained their definitive condition of organisation. They have established in a general manner this proposition, only admissible with regard to non-congenital displacements—that thoracic hernia of the abdominal viscera always occurs on the left side, the adherence of the liver to the diaphragm rendering the occurrence impossible on the right side."

ii. Littré has observed in a dog a similar disposition to the above related. The stomach had ascended into the thorax through a considerable fissure of the diaphragm, corresponding in point of position to the œsophageal opening; in other respects, the details of the case are scanty.

iii. Haller (vol. vi, page 679) says he dissected a female foetus, where the left half of the liver, with the stomach, some part of the small intestine, the duodenum, the whole of the spleen, and the greater part of the omentum, had passed into the left thorax through a fissure of the diaphragm in its upper part between the tendinous centre and the cartilages. The left lung was only a third of the size of the right; the thymus was not so large as natural, but triangular,

and touching the trunks of the vena cava and aorta. There was no sign of external lesion.

iv. Dr. W. Campbell, in the *Midland Medical and Surgical Journal*, relates this case. A woman, aged 43 years, brought forth a foetus at full period, on May 29th. The child, when born, had slight torpor, from which it soon recovered. It was large, well shaped, but dull and inanimate during life. It fed with ease, never vomited, passed urine and faeces regularly, but not without frequent laxatives; the evacuations were natural. It slept well, but breathed with difficulty. It thrived very little, and died on July 2nd, having had partial convulsive fits twelve hours before death.

Autopsy by Lizars. The abdomen contained the liver, the sigmoid flexure of the colon, and the cardiac portion of the stomach (these communicating through an opening in the diaphragm), and the kidneys. The other splanchnic viscera were in the thorax. The mediastinum was pressed to the right, equally so the heart and left lung; the latter was so compressed, that except a small portion of surface, it had not been inflated, and resembled the thymus gland.

v. Dr. Campbell, in his report, cites the following cases (v to xvi): one by Sir C. Holt, in the twenty-second volume of the *Philosophical Transactions*, 1701, like the above, except that it lived two months, and both lungs acted. It had dyspnoea.

vi. One case is reported in the second volume of Foothergill's works, less in amount.

vii. A case is given by Astley Cooper, in the *Medical Records and Researches*, in which a portion of intestine was in left thorax. It was a female, and she lived twenty years, and died with symptoms of strangulated hernia. There was a circular opening in the diaphragm two inches in diameter.

viii. Morgagni, *Epist. Anatom. Med.*, liv, section 11, quotes a case from Leproth, where part of the colon was in the thorax, passing through the diaphragm at its attachment to the ensiform cartilage. The subject, a male, lived to advanced age.

ix. Bartholinus and Clauderus give cases of the stomach, omentum, pancreas, duodenum, and colon, in the left thorax.

x. In the *Histoire de l'Académie Royale des Sciences*, 1729, vol. i, p. 14, Chauvet relates the case of a Lieutenant-colonel, in whom the stomach, spleen, and colon were in the left thorax, passing through an opening with a cartilaginous margin to the left of the spine; he concludes that this condition of the margin is a proof of congenital formation.

xi. Riverius in his *Observationes Medicae*, art. iv, observ. 67, and Bonetus in his second volume, p. 103, both give the case of a young man, aged 24 years, whose stomach was in the right thorax.

xii. Vitter, in his *Aphorism. Pathol. Anat.*, p. 144-5, gives the case of a healthy old man, in whom the whole small intestine passed immediately behind the cava into the left cavity of the thorax, and completely compressed the lung of that side.

xiii. In some work is recorded the case of a child which lived six weeks with the whole left half of the diaphragm wanting, almost the whole abdominal viscera being in the thorax.

xiv. Becker saw a case of left diaphragmatic hernia which lived five years.

xv. Diemerbroeck dissected a subject where the diaphragm was entirely absent: it had continued to live seven years without inconvenience, except frequent cough.

xvi. Rivière and Petit give instances of life much more prolonged.

xvii. Dr. Edward Murphy (*Cyclopædia of Anatomy and Physiology*) had a case where the intestines were in the left thorax. The opening in the diaphragm was anterior and to the left of that for the oesophagus, and appeared to be from separation of the fibres of the muscle. The right lung was natural; the left not larger than half an almond kernel and solid. The stomach, spleen, and liver, were in natural position. It had also spina bifida.

xviii. M. Anthony (*Journal Hebdomad.*, 1835) records a case where the left wing of the diaphragm did not exist; the small intestines and spleen were in the thorax. The child lived half an hour.

xix. Mr. O. E. P. Chard of Wye, in the *Medical Times*, vol. xxi, p. 75, relates a case of aperture in the left side of the diaphragm at its posterior part, through which the intestine from the commencement of the jejunum to the descending colon had passed into the thorax. The heart was placed more to the right side; the left lung was of the size of a walnut; the right one was small and compressed. The child gave a peculiar shrill cry at birth; it breathed with a slight noise, and lived twenty hours.

xx and xxi. Mr. Chard refers to two cases of Dr. G. Mac-

aulay, in the first volume of the *Medical Observations and Inquiries*. In one of these, the stomach, spleen, and part of the pancreas were in the thorax. In the other, the opening was in the right side, and the small intestine and considerable portion of the liver were in the right thorax; the right lung was very small, and the heart was placed to left side. This child lived three-quarters of an hour, the former one an hour and a half.

xxii. Baron, in the *Archives Générales*, tom. vii, p. 142, records the case of a foetus born at full period that had a rounded opening in the right side of the diaphragm near its pillar, admitting through it the stomach, the whole of the small intestine, and a large portion of the right lobe of the liver.

xxiii. Destrès, in *Transactions Médicales*, tom. xii, p. 309, details the case of an anencephalous monster having an irregular oesophagus. The stomach was in the superior and posterior part of the thorax behind the folds of intestines, the left lung, the base of the heart in front of the aorta and pulmonary artery, having its great curvature above and lesser one below; the pylorus being placed in the middle of the lesser curvature. The great curvature adhered closely to the bodies of the vertebrae (first dorsal), and was separated from them with difficulty. The spleen adhered to the great curvature, and occupied the summit of the left thoracic cavity. There was no gastro-hepatic omentum; the gastro-colic was very small, floating upon some undulations of small intestine, and enclosing two glandular bodies analogous to the spleen. The small intestines occupied the middle part of the left thorax. The liver, very large, nearly filled the abdomen and the inferior and anterior part of the left thorax, into which it penetrated through a large opening in the middle of the diaphragm. The left side of the diaphragm was absent. The coecal valve was situated in the middle and posterior part of the left thorax. The colon passed into the thorax, then descended between the two kidneys, and formed below them two sigmoid flexures, then terminated in the rectum, which, descending perpendicularly within the pelvis, was at least four times the natural size. The kidneys were large and lobulated. The suprarenal capsules were very small. The left lung was transversely placed at the superior anterior part of the thorax, with its external face forwards, its internal face backwards. The heart was large, being in the right side of the thorax; the apex was below, and towards the right costal cartilage. It had two ventricles: the left one in front and to the left, without an auricle; the right one, behind and to the right, having a very large auricle. The base of the heart was adherent by the base of the left ventricle to the root of the left lung. The left ventricle was very small; the mitral and sigmoid valves were absent, the opening of the ventricle being closed by a simple partition; this ventricle communicated with the right auricle. The right ventricle was very large; the tricuspid and sigmoid valves were absent. The aorta from its origin from the left ventricle passed upwards and backwards, giving off immediately at its origin the right carotid, which was very large, and this furnished the subclavian of that side; then the aorta gave off the left carotid, and furnished an arterial canal, which terminated at the left subclavian. The pulmonary artery, given from the right ventricle, passed upwards backwards and to the left, behind the left lung, before the arch of the aorta, to the root of the left lung; then it passed to the summit of the left thorax, recurved, and descended the length of the vertebral column on its left side. At its origin from the right ventricle it gave branches, short and large, to the right and left lungs. Eight lines from its origin, it united itself by its curvature with the aorta by means of a short and moderately thick arterial canal. The pulmonary artery performed the function of the aorta, furnishing the splanchnic organs and limbs, and terminating by the umbilical. The base of the left ventricle is united to the root of the left lung by dense cellular tissue, and received directly the pulmonary veins. The right auricle received blood from the whole body, a small portion of it entering the left ventricle with that from the pulmonary veins, to be sent only to the head and thoracic extremities. The pulmonary artery furnished all the other parts of the body.

The absence of the left auricle, the reduction of the left ventricle, and nearly the absence of the diaphragm, reduce the above case near to reptiles. In the crocodile, the head only receives arterial blood.

xxv. Dr. Druitt, at the Medical Society, exhibited the stomach and oesophagus of a young cat, which died suddenly after a hearty meal, the diaphragm being deficient in the centre. The cardiac portion of the stomach was displaced upwards, and, being filled with food, formed a solid tumour in the posterior mediastinum, which arrested the heart's action. (*Lancet*, 1852, p. 430.)

Table of Cases.

No.	Abdominal organs within thorax.	Condition of lungs.	Diaphragm.	Duration of life.
1	Stomach, small intestine, and right lobe of liver.	Not recorded.	Absent on right side.	Probably at birth.
3	Stomach, small intestine, spleen, and left lobe of liver.	Left lung little developed.	Fissure between tendinous centre and cartilgs.	Died at birth.
4	Pyloric end of stomach, spleen, and small intestine.	Left lung not inflated.	Not recorded.	5 weeks.
5	Same as No. 4.	Both lungs acted.		2 mths.
7	Part of intestine.	Normal.	An opening of 2 inches diameter.	20 yrs.
8	Part of colon.	Well developed.	Opening not large.	Advanced age.
10	Stomach, spleen, colon.	Normal.	Ditto.	Mature age.
11	Stomach in right thorax.	Ditto.		24 yrs.
12	Whole small intestine.	Left lung compressed.	Small opening.	Old age.
13	Nearly whole of the viscera.	Not recorded.	Left half absent.	6 weeks.
15		Ditto.	Entirely absent.	7 years.
17	Intestines.	Left lung not developed.	A fissure in it.	7wks.(?)
18	Small intestines and spleen.	Not recorded.	Left wing absent.	Half-an-hour.
19	Whole intestine.	Left lung size of walnut; right, small and compressed.	Aperture in posterior part.	20 hrs.
20	Stomach, spleen, pancreas.			1½ hr.
21	Small intestines, large part of liver.	Right lung very small.	Opening in right side.	¾-hour.
22	Stomach, small intestine, and large part of right lobe of liver.	Not recorded.	Rounded opening in right side.	Died at birth.
23	Stomach, small intestine, colon, part of liver, and spleen.	Developed.	Left side absent.	Ditto.
24	Cardiac portion of stomach.	Not noted.	Deficient in centre.	Puberty.

The cases may be thus classed.

1. Cases 3, 22, and 23, did not survive birth; and to these may be added Mrs. M.'s child, and probably Case 1. Nearly the whole of the abdominal viscera, including the liver, were within the thorax. The lungs were little developed. The diaphragm was not greatly deficient.

2. Cases 18, 20, 21, lived respectively half an hour, three quarters of an hour, and an hour, with a large proportion of the abdominal viscera within the thorax—a less portion of the liver than in the above class. One lung was very small in one case; the size is not noted in the others. The left wing of the diaphragm was absent in one (No. 18).

3. Case 19 survived twenty hours. The whole of the intestines were contained within the thorax. One lung was small and compressed; the other was not inflated.

Cases 4, 5, 13, 17, lived a few weeks. The small intestines, spleen and pylorus, were within the thorax in two of these cases (4, 5); the small intestines in Case 17; and nearly the whole abdominal viscera in Case 13. The left lung was not inflated or not developed in Cases 4 and 17. Both lungs acted in Case 5. The diaphragm was deficient of its left half in Case 13. It had a fissure in it in Case 17.

5. Cases 7, 8, 10, 11, 12, 15, lived some years. In Case 10, the stomach, spleen and colon, were within the thorax. In three others, a less proportion of the abdominal organs was

within this cavity. The lungs were well developed in all except Case 12, in which the left one was compressed. The diaphragmic deficiency was not great, except in Case 15, where this muscle was entirely absent. To this class are to be added the cases given by Littré and Druitt, of a dog and cat.

This collection seems to lead to the inference (as far as allowable from such partial details), that non-viability is due to the amount of splanchnic viscera within the thorax compressing the lungs, and preventing their development or inflation. In only one instance, where life continued some years, was there a large amount of these organs within the chest cavity (Case 10).

In the first class, nearly the whole abdominal viscera were within the thorax; these were all foetal.

In the second class, a less amount, and notably less of the liver, and so on in a diminishing ratio through the other series; Case 13 is a doubtful exception, from the loose and general terms in which it is recorded, and the absence of the authority.

The misplacement of the various organs is not at all in proportion to the deficiency of the diaphragm; nor is the viability, for in Case 15, life continued seven years, notwithstanding the entire absence of this important muscle of respiration.

I had the opportunity of observing accurately in Mrs. M.'s child that death occurred from inability to inflate the lungs, to which repeated efforts were made, unsuccessful doubtless from the presence of the malposed viscera having prevented the development of one lung, and probably preventing the expansion of the other.

It is supposed these abnormalities are not rare, yet the few I have been able to gather in a considerable search, show that they are either rare or not sufficiently put on record, and certainly not with sufficient fulness and accuracy; and I would ask those who have met with similar instances to publish them; all congenital defects are interesting to the physiologist and pathologist, however little valuable in practical medicine.

TEN YEARS OF OPERATIVE SURGERY IN THE PROVINCES.

By AUGUSTIN PRICHARD, Esq., Surgeon, Clifton, Bristol.

II.—OPERATIONS ON THE ABDOMEN AND LOWER INTESTINE.

[Continued from p. 836.]

Inguinal Hernia. CASE LVII. S. B., aged 38, was admitted with strangulated hernia of the left side, of about twelve hours standing. His truss had been broken. Upon using the taxis, the tumour became smaller, and appeared to have been reduced; for the patient was relieved, and the bowels were moved; but, twelve hours afterwards, the swelling returned, and he complained of great pain. I tried the taxis again, but ineffectually. Upon operating, I found that the sac merely contained omentum and a large quantity of fluid. The omentum was thickened and extremely congested by the pressure of the neck of the sac. I tied and removed a considerable portion of it, and brought the wound together as usual. This patient made a fair and speedy recovery.

CASE LVIII. W. H., aged 50, an extremely fat man, with inguinal hernia of the right side, which he has had twenty years, but has only worn a truss for two years. Symptoms of strangulation began about eighteen hours before I saw him, but they were not very urgent. He had been bled, and the taxis used, with warm bath and other means. After trying again to reduce the swelling, but in vain, I operated, and had to divide an enormous thickness of fat, so that the length of an ordinary director was only just sufficient to reach from the skin to the external ring. The sac was opened, and a small tumour was found in it, not having the usual black colour of strangulated intestine, and it appeared to be fixed in the canal. Finding the rest of the openings free, I brought the parts together, and ordered him some opiates. No very troublesome symptoms followed, but the wound healed slowly.

I do not believe that, at the time of the operation, this patient was suffering from strangulation; but the difficulties of the case were unusual, for he had symptoms of obstruction (vomiting and pain in the tumour), and the hard swelling in