The Bunterian Lectures
ON
THE NATURE AND ANATOMY OF ENTEROPTOSIS (GLÉNARD’S DISEASE).
Delivered before the Royal College of Surgeons of England on
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LECTURE III.1
Delivered on March 6th.
PTOSIS OF THE LIVER AND STOMACH.
MR. PRESIDENT AND GENTLEMEN,—Displacement of the
liver and stomach springs chiefly from two causes—either
from the relaxation or paresis of the abdominal muscles
which maintain the visceral shelves on which these organs
are supported or, as is more frequently the case, the body
cavity is constricted by clothing or contorted by disease, so
that the normal respiration swing forwards cannot take place.
In either case the visceral displacements are much the same.

![Image of partial ptosis of the viscera in a woman, aged 45 years.](image1)

The position and shape of the liver and stomach, shown
in Figs. 14 and 15, are characteristic of the general type
of enteroptosis so frequently met with in our dissecting-
room. The subject from which the illustrations shown in
Figs. 14 and 15 were made was a woman, aged 45
years, in whom the viscera were fixed and hardened
in situ by the injection of formalin after her natural waist of
26 inches had been reduced to 22 inches by corsets, a
reduction quite within the limits of ordinary practice. The
condition of the viscera shown was present before death;
the corsets merely help to emphasise the natural characters
of the displacements. To understand how such a condition
has been produced a number of points have to be
observed. The extrusion of the viscera from the sub-
diaphragmatic space is due (1) to the constriction of the
thorax; (2) to the pressure applied to the epigastric region
which prevents the stomach and liver swinging forwards
so as to over-ride each other; and (3) to the depression
of the ribs (see Fig. 15) which throws the costal fibres
of the diaphragm into a more vertical position; they
tend then to press the viscera downwards rather than
forwards. The corsets when worn prevent an inspiratory
depression of the liver; the viscera become, when so re-
strained by the application of corsets, a fulcrum on which the
chest is raised. But when the corsets are removed or undone
the muscles of the wall of the abdomen, being weak from
disuse, are ill equipped to oppose the action of the dia-
phragm. In the body shown the subcostal arch is narrow,
but had the patient lived it would have opened out as the
viscera were displaced further downwards until, instead of
measuring 50°, it would have reached 90° or more.

![Image of lateral view of the same subject as in Fig. 14.](image2)

Riedel’s lobe.—Why is it that in partial or complete cases
of visceral ptosis there is always a tendency for the lower
extremity of the right lobe of the liver to be produced into a
linguiform process (Riedel’s lobe), such as is shown in Figs. 14
and 15? Two circumstances have to be taken into account.
1. The part of the right lobe which lies beneath the tips of
the tenth and eleventh ribs is the first to escape from beneath
the lower margin of the thorax; the pressure of the costal
margin tends to separate the part extruded from the part
within the thorax. 2. But a more important circumstance
lies in the fact that the space between the crest of the
iliac and the tips of the eleventh and twelfth ribs is the
part of the abdominal wall least protected by muscular
support. Fasciculi of the external and internal oblique are
the sole muscle supports in this region. Owing to the crest of
the ilium, from which they act, projecting further outwards
than the tips of the eleventh and twelfth ribs, on which they
act, these muscular slips tend to draw the ribs outwards
rather than inwards during expiration and hence are ill
designed to prevent the displacement of the liver towards
the right loin. This is markedly true of the female (see
Fig. 14).

FIXATION OF THE KIDNEYS.
If one will analyse and estimate the various forces
which maintain the kidneys in their normal position,
it will be found that by far the most important is
the constant pressure exerted on them by the diaphragm
on the one hand and the muscles of the abdominal wall
on the other. Unlike the liver, the stomach, and the spleen,
the kidneys rest on no visceral shelf. While the diaphragm
exerts its force directly on them the muscles of the abdo-
mental wall can act only indirectly through the abdominal
viscera. In front of the right kidney are the liver.

1 Lectures I. and II. were published in THE LANCET of March 7th,
1903, p. 631.
duodenum, colon, and small intestine; in front of the left kidney, the stomach, spleen, colon, and small intestine; through these the muscular wall of the abdomen maintains the kidney against the diaphragm, quadratus lumborum and psoas muscles.

Next in importance to the muscles is the loose connective tissue or perirenal capsule in which the kidney is imbedded. Recently the capsule has been differentiated by Zuckerkandl into two layers—the pre-nephric and post-nephric fasciae, but every time I seek to demonstrate the described disposition and relationship of these fasciae I feel that I make a greater demand on the imagination of my students than on their powers of observation. Moreover Zuckerkandl’s description of the perirenal capsule makes a simple matter difficult. As a passive renal bond the perirenal capsule is of the very first importance. By it the kidneys are bound to the diaphragm and for practical purposes to the diaphragm only. At the upper pole of the right kidney the tissue of the capsule fuses with the connective tissue of the mesepicon on the right side.

(Fig. 16) and with the tissue of the coronary ligament of the stomach, lower mesenteric ligament, the spleen on the left side. Along with the viscera just named the kidneys are fixed to the arcuate fibres of the diaphragm (Fig. 17). At the outer border of each kidney the capsule is continuous with the dense subperitoneal fascia of the diaphragm and transversalis fascia and muscle; but at the lower pole of the kidney the tissue of the capsule is loose and open and freely permits the respiratory descent of the kidney. The meshes of the posterior layer of the capsule become laden with a peculiar fat from one to two months before birth. The fat serves as a perirenal bursa or slide on which the respiratory movements of the kidney take place.

There is, too, another renal bond also connected with the perirenal capsule—namely, the renal pedicle. The pedicle is made up (1) of the renal artery; (2) of the renal vein; (3) of dense connective tissue derived from the radix mesenterica which fuses with the perirenal capsule at the inner border and hilum of the kidney and with the fibrous covering of the suprarenal bodies; and (4) of the renalplexus of nerves and lymphatics. The renal pedicle limits the extent and direction of the movements and displacements of the kidney. As a bond the peritoneum which covers the anterior or outer surface of the kidneys may be left out of account; it is so designed as to permit renal respiratory movements; it is so attached that it could only prevent a diminution of the subdiaphragmatic space. Un fortunately such a diminution may be produced in many ways: (1) by compression of the thorax with clothing; (2) by a partial collapse of the thoracic walls following chest or spine disease; and (3) by the permanent contraction of the diaphragm which follows a relaxed or paretic condition of the abdominal walls. In cases of general enterophtosis the muscular fasciculi of the diaphragm measure on an average only two and a half inches, against three and a half to four inches in a condition of health. I suspect, too, that in some cases of pleurisy the diaphragmatic connective tissue is contracted or in a cirrhotic condition which leads to a diminution of the diaphragmatic domes. When the
Displacement of the left kidney.—Why is it that the left kidney is so seldom displaced? The answer is that the left hypochondrium is provided with a safety valve in the shape of the splenic flexure of the colon, which is so formed and fixed that it may enter or leave the hypochondrium with the greatest freedom as the stomach empties or fills. The mechanism will be better understood by referring to Fig. 18.

The position of the splenic flexure, the spleen, and the left kidney when the stomach is full. When empty the kidney and spleen ascend an intercostal space, while the splenic flexure is moved upwards into the angle between the spleen and stomach, which represents the position of the organs in the left hypochondrium from behind when the stomach is full. When full the liver, as Symington and Cunningham have pointed out, is tilted more into the right hypochondrium, the left kidney is forced half an inch or more downwards, the spleen is carried outwards on the distended fundus of the stomach, but the part which is displaced by far the most is the splenic flexure of the colon. Professor Birmingham has clearly described the manner in which the colon replaces the gastric contents. Hence it is that when the left hypochondriac space is reduced, the splenic flexure, being in the habit of going and coming, can accommodate itself to a partial or complete subcostal position, leaving the kidney and other organs undisturbed. The extrusion of the colon, however, may not be enough to compensate for the diminution of the subcostal space. Hence the frequent presence of a Riedel's lobe of the liver with a partial displacement of the left kidney.

Displacement of the left kidney in women.—It is commonly said that the kidney is ten times displaced on the right side for once on the left and that renal displacements are ten times more common in women than in men. Yet at birth the two kidneys are equally placed; through a long series of human ancestors I noted no difference of sex, of size, or of individual in the position of the kidneys. In fact, the only variable factor then is the relationship of the colon to the right kidney; it is commonly below or in front of the hilum, but it may lie internal to the kidney or in the loin below it. On the other hand, the splenic flexure of the colon is always bound to the front and outer border of the left kidney.

The liability of women to renal displacements begins at puberty and increases in frequency with each decade up to the fifth. As the female sexual characters are developed the iliac crests expand outwards and the transverse diameter of the body becomes greater than the transverse diameter of the lower part of the thorax by an inch or more. In children, as in primates, the pelvis is narrower than the chest. In some women, from natural conformation or from an exaggeration of the normal form by the use of stays, the iliac crests may project outwards on each side two inches or more beyond the lateral wall of the thorax formed by the lower ribs. The eleventh and twelfth are the only ribs that have a relationship to the kidney (see Fig. 17). As far as their movements are concerned both of these ribs may be regarded as part of the abdominal wall. They ride outwards and inwards with the inspiratory expansion and expiratory contraction of the abdominal wall. The movement of the ribs depress them and thus limit the space in the loin into which the kidneys descend during inspiration are fasciculi of the external and internal oblique, which rise from the crest of the ilium. When the projection of the iliac crest is considerable the depression of the lower ribs become marked these muscular fasciculi, instead of compressing the loins and assisting the expiratory return of the kidney, tend rather to prevent its return by expanding the capacity of the loins. In this sexual character is to be found at least one of the causes which render women more liable to kidney displacements than men.

High versus low waist.—It frequently happens that in women who bear evidence of constriction from corsets the right kidney is situated at a higher level than usual; occasionally it may be found completely above the twentieth rib. In such cases a long lumbar region has allowed the waist to be formed well below the costal margin; the constriction of the corsets forces the kidney upwards; in short waists, on the other hand, the waist is formed at or above the level of the kidney. In connexion with the formation of the waist the relative size of the twentieth rib must be taken into account. The twentieth rib is more frequently short or vestigial in the female than in the male.

Relationship of the colon to the kidney.—Cases have been recorded by Sir Frederick Treves and Dr. T. J. MacLagan, and similar cases have been described by Mr. J. Hutchinson, jun., in which a floating right kidney has given rise to obstruction of the bile-ducts. In such cases plosis of the liver and stomach with great elongation of the gastro-hepatic omentum will be found, presenting the condition of the colon as shown in Fig. 14. Besides these derangements three others may be noted when the viscer a are exposed by the reflection of the belly wall. 1. The head of the pancreas and duodenum are displaced forwards as well as downwards, being almost completely extruded from below the liver. 2. The hepatic flexure, still attached to the peritoneum over the kidney, is displaced downwards in the right loin. 3. The lower pole of the right kidney covered by its peritoneum, and partially rotated on the renal stalk, protrudes in an interval on the anterior surface of the abdominal viscera, between the liver above, the hepatic flexure below, and the duodenum and pancreas to the left. The kidney causes obstruction of the duodenum rather than of the bile-ducts, accounting for this condition the relationship of the colon to the kidneys must be taken into account. The transverse colon is so suspended and folded that it may easily accommodate itself to the movements of the colon in the hypochondria, to the filling and emptying of the stomach, and to its own state of distension. Its mesentery forms a shelf for the liver, stomach, and spleen and is ptosed downwards if the colon is displaced upwards, and the transverse colon is fixed closely to the peritoneum over the kidneys by the hepatic and splenic flexures, but the part at the hepatic flexure lying just below the liver is less...
adapted for movement than the part below the stomach near the splenic flexure. If then there is plexus of the subdiaphragmatic viscera, or if the colon be overloaded and distended, the peritoneum over the kidneys is drawn downwards and forwards owing to the traction exercised on it by the displaced transverse colon. The hepatic segment being the more fixed cannot be depressed without pulling on the peritoneum over the right kidney, thus making a space into which the kidney may be displaced forwards. It is the forward displacement that constitutes a floating kidney.

**Fixation of the Intestinal Tract.**

Up to this point attention has been directed to the fixation and movements of the human viscera, but now, in seeking to unravel the complicated and peculiar manner in which his intestinal tract is fixed, it is necessary to turn to the scheme of visceral fixation in other animals.

Seventeen years ago, from this same chair, Sir Frederick Treves solved many problems regarding the arrangement of the human peritoneum by a reference to the rich field of mammalian anatomy. It is most profitable, however, to turn at once to the primates, that order of mammals with which man has been brigaded from ancient times and from the stock of which, if there is any truth in the process of evolution, man certainly sprang. Point for point, even in minute detail, the abdominal and thoracic viscera of the anthropoids—the orang, gorilla, and chimpanzee—are fixed in the same manner and situations as in man (Fig. 19).

**Fig. 19.**

Diagram of the posterior wall of the adult human abdomen showing the areas of visceral fixation. Four of the five areas of mesenteric adhesion are represented by distinctive marks: +, mesogastric adhesion; O, mesenteric adhesion; 0, upper mesocolic adhesion; (+), lower mesocolic adhesion.

To find a condition parallel to that in the commoner forms of apes or pronograde monkeys one must take the arrangements of the vertebral column found in the child at birth or a little after birth (Fig. 20). The manner in which the viscera are fixed in the lowest primates, such as some South American monkeys or in lemurs generally, is morphologically identical with the human condition at the third month of development (see Fig. 21). The net result which one brings back from a study of the anatomy of the primates is, that with the evolution of the orthograde posture and orthograde type of respiration, mesenteric adhesions, which appeared one after the other in five different areas, spread out and bound the alimentary tract more and more to the abdominal wall, as the animal became more orthograde in posture. The manner in which the viscera are fixed in man results from his posture and respiration. The cells which bring about these mesenteric adhesions fill the broad base of the fetal mesentery, but how they became sensitive to the new needs of the evolving organism is a problem yet to be solved. The five areas of adhesion referred to above (see Figs. 19, 20, and 21) are the following: (1) mesogastric; (2) mesoduodenal; (3) mesenteric; (4) upper mesocolic; and (5) lower mesocolic.

The mesogastric adhesion (Fig. 19).—Although the dorsal mesogastrium is produced into the great omentum in all primates, it is only in man and orthograde primates that its root becomes adherent to the posterior abdominal wall. The celiac axis marks its original point of attachment; from there the process of adhesion spreads outwards over the left suprarenal body and upper part of the left kidney until it reaches the spleen which is attached to the mesogastrium. In 85 per cent. of children at birth the process of adhesion has extended almost to the outer border of the left kidney, thus binding the spleen to that organ. Since the tail of the pancreas lies in the root of the mesogastrium it also becomes adherent to the posterior wall of the abdomen.

The mesoduodenal adhesion.—The adhesion of the right aspect of the mesoduodenum to the hilum of the right kidney is, with the exception of the mesenteric, the latest to appear. It is commonly incomplete, the adhesion mainly affecting that part of the duodenum across which the colon passes. The duodenal adhesion can always be easily undone and by so doing the freest surgical access is obtained to the lower or post-duodenal stage of the common bile-duct. The adhesion extends after birth outwards on the kidney.
The lower mesocolic adhesion. — The process of adhesion, which leads to the fixation of the splenic flexure to the front of the left kidney and of the descending colon and mesentery to the left loin, is earlier in appearance than either the mesoduodenal or mesenteric, but later than the mesogastric and upper mesocolic. It is seen only in the orthograde group of primates and is an adaptation to the upright posture. The mesentery of the splenic flexure and descending colon is primarily attached in the middle dorsal line along the aorta, being continuous anteriorly with the radix mesenterica and mesentery of the duodenum. The process of adhesion, commencing in the base of the mesentery, spreads outwards by a species of growth over the left kidney and left loin until the colon itself adheres to the parietal wall. The process of adhesion proceeds to a variable extent in the mesosigmoid. It may proceed down into the iliac fossa and fix closely the upper part of the omega loop there or it may stop short and give rise to the inter-sigmoid fossa.

The upper mesocolic adhesion. — By this adhesion the transverse colon, the hepatic flexure, and the ascending colon are fixed in position; the cecum and appendix being developed as protrusions from the bowel have no proper mesenteries. This, the primary adhesion of the five, is present in all primates and is the most difficult to describe. The important circumstance to remember is that the duodenum and upper segment of cecal region of the colon are developed at the same time and side by side from the base of the yolk sac, their mesenteries forming one continuous mass. Dr. Chalmers Mitchell has shown that in birds and mammals alike these two structures—the duodenum and cecal segment of the colon—are united by a fold of mesentery. The duodenum and colon being thus adherent the mesogastrium when it grows outwards. Mr. Arbuthnot Lane has called attention to the inter-sigmoid fossa by its horizontal mesocolon and accommodates itself to the free respiratory oscillations of the organs in the subcostal region. The transverse mesocolon forms a shelf for the subdiaphragmatic viscera and separates them from the coils of the small intestine. The transverse colon is markedly displaced in cases of enteroptosis; the descent of the subdiaphragmatic viscera carries it and its mesocolon downwards.

Respiratory movements of the transverse colon. — While the hepatic and splenic flexures of the colon are closely adherent to the right and left kidney and accompany them in their respiratory movements, the transverse colon is swung loosely by its horizontal mesocolon and accommodates itself to the free respiratory oscillations of the organs in the subcostal region. The transverse mesocolon forms a shelf for the subdiaphragmatic viscera and separates them from the coils of the small intestine. The transverse colon is markedly displaced in cases of enteroptosis; the descent of the subdiaphragmatic viscera carries it and its mesocolon downwards.

The mesenteric adhesion. — The adhesion of the mesentery of the small intestine to the posterior wall of the abdomen, in an oblique line drawn from the termination of the duodenum to the cecum, is a character of those primates which are adapted to the orthograde posture (Fig. 19). The mesentery of the small intestine, together with that of the ascending and transverse colons, is originally a fan-shaped sheet with only its apex attached at the radix mesenterica. The apex is wedged in between the colon and mesocolon, and the mesenteries of the lower colic segment and duodenum. In the human child at birth only the apex and the colic edge of this fan-shaped sheet are attached (Fig. 20). That attachment forms the root of the transverse mesocolon, but the rest of the mesentery is free. Immediately after birth the process of adhesion, starting at the transverse or mesocolic edge, spreads downwards in the direction of the right iliac fossa. It is not uncommon for this process of adhesion to be arrested at various stages. The attachment of the whole of the small bowel is sundered from the radix mesenterica or the ascending colon, and the termination of the ileum may be left free and these parts are then liable to become the seat of volvulus. Even when the mesenteric adhesion spreads to its normal extent the radix mesenterica and superior mesenteric arteries are the main intestinal support.

Intestinal movements and displacements of the small intestine. — The small intestines lie in a special peritoneal compartment formed by the mesocolon and great omentum. Under the pressure of the belly walls they support the horizontal subdiaphragmatic shelf formed by the transverse mesocolon. This septum cuts off the respiratory movements of the liver, spleen, and stomach. Intestinal displacement may be due either to a diminution of the costal part of the body cavity, the subcostal viscera being thus thrust down on the small intestines; or, on the other hand, the support accorded them by the muscular walls of the abdomen may give way. Their displacement is then followed by the de-crest of the subcostal viscera. When the intestines are forced into the pelvis, displacing the pelvic viscera, traction on the superior mesenteric artery and radix mesenterica causes a partial obstruction of the third stage of the duodenum.

Time and space prevent my dealing with the various displacements that overtake the pelvic organs and pelvic wall in cases of enteroptosis. On some future occasion I hope to be able to deal with them.

SMALL-POX HOSPITAL FOR GLOUCESTER.—The Local Government Board has sanctioned the application of the Gloucester corporation to borrow £2000 for the purpose of erecting a small-pox hospital.

Bristol Medical Mission.—The annual meeting of the subscribers to this charity was held on March 3rd under the presidency of Sir Herbert Ashman. The medical report stated that 8750 patients had been treated during 1902. The financial statement was satisfactory.