ON THE SYMMETRY OF THE PANCREAS AND SPLEEN.

DO THE SHOULDER-TIP PAIN AND OTHER SYMPATHETIC PAINS OCCUR IN DISEASES OF THESE TWO MEMBERS OF THE PNEUMOGASTRIC SERIES?

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In a paper read at the Newcastle meeting of the British Medical Association, in August, and printed in the JOURNAL in October and November, 1870, I endeavoured to explain the mode in which, as it occurred to me, the above-named pains arise in diseases of the liver, and to enumerate the diseases of that organ in which the pains occur. In the present paper I wish to fulfil a promise made in the former, that I would endeavour to show that similar pains occur at the shoulder-tip, and in other parts, in diseases of other organs of the pneumogastric series.

Under this term I comprise, of course, all those viscera that receive a supply of nerves from the medulla oblongata through the par vagum. They all lie in the neck, chest, and abdomen; and it is only with regard to some of those in the latter cavity that any doubt exists as to their really belonging to the series, for anatomists differ as to the distribution of the abdominal branches of the par vagum. The majority agree that the stomach, liver, spleen, and pancreas, receive pneumogastric nerves, although the hepatic and splenic branches are variously described by different authors; some exclude from the series the pancreas, the kidneys, and suprarenal bodies; whilst others include in it not only these organs, but a considerable, though unascertained extent, of the small and large intestines.

To fix the exact inferior limits of the wandering pair is a matter of great difficulty, perhaps of impossibility, on account of the complexity of the abdominal nervous system, through the intricate interlacement of the branches of the par vagum with those of the sympathetic system. There is good evidence, from our latest anatomists, that the pancreas receives nerves from the par vagum, and that the kidneys and suprarenal bodies, and a considerable extent of the alimentary canal below the stomach, also receive branches from the same source. All the viscera receive, together with their pneumogastric branches, a copious supply of plexuses of nerves and ganglia from the sympathetic system, and a few small twigs from the spinal cord.

It is presumable, that any of the organs of the pneumogastric series, when inflammatorily and painfully diseased, may give rise to tenderness of the trunk of the par vagum in the neck, to pain there, or in the head, or some part of the shoulder, and side of the chest. Those members of the series which lie in the neck are too near to the trunk of the nerve to allow tenderness of the nerve to be distinguished from that general tenderness caused by the disease in the organs themselves, and I am not aware that in diseases of these organs the shoulder-pain exists.

The effects of disease in the organs at a greater distance from the trunk of the nerve are much more likely to give rise to distinguishable pains at the parts named, but I am not aware of any records existing to show that these pains have been noticed in diseases of the thymus, or thyroid gland, of the suprarenal bodies, or the intestine. They exist, however, commonly, in diseases of the lungs; are less prominent, on the whole, in diseases of the heart; are met with frequently in diseases of the liver (as is well known); of the stomach, spleen, and kidneys; some of them have been remarked also in pancreatic diseases.

The present communication has reference to the pancreas and the spleen, and the shoulder-pain in their diseases; but before coming to the subject of these sympathetic pains, it appears to be necessary to obtain as clear an idea as possible of these two viscera, to ascertain whether they are double or single organs, and what is their proper relation to the median line of the body, and to the par vagum nerves. Are they to be regarded as symmetrical, or asymmetrical?

It is held as a general rule, in the vertebrate kingdom, that animals, as regards the lateral halves of their bodies, are symmetrical; that is, that one half is a reversed copy of the other, the halves being united on the median line of the body, and diverging equally from it in opposite directions. (See article "Symmetry," by S. R. Pittard, in Todd's *Cyclopædia of Anatomy*, vol. iv.)

This rule or law of lateral symmetry, or lateral homology, as it has been called, is most clearly expressed in the early stages of the development of the embryo; but, as development and growth proceed, it becomes less stringent, its operation is more or less interfered with, and its results, in certain cases, so obscured, that they may elude observation, or be misconstrued. Now, though animals are laterally symmetrical enough for all the purposes of their lives, a scrutiny of their various

parts affords ground for observing that perfect lateral symmetry is, strictly speaking, the exception, rather than the rule, in the adult body; and moreover, that the deviations from the law are advantageous to animals, rather than the contrary. Many deviations from the original law are found, both in the vertebrate and in the invertebrate kingdom. The following are notable, and mostly well-known examples; in the latter kingdom, the valves of anomie, and many other mollusks, the spiral shells of conchifera, the naked bodies of tunicata, nudibranchiata, limaces, etc.; in the former, the flat fishes, the internal male and female organs of birds, the penes of birds, the beak of the crossbill, the left incisor of the narwhal, etc.

In the human body, putting aside cases of monstrosity, we have not far to look for exceptions to the law of symmetry; indeed, there is hardly an organ that can, strictly speaking, be said to be quite symmetrical.

The whole right side of the body is usually larger than the left, and now and then this is reversed. The distribution of the component parts, as the blood-vessels, nerves, and muscles, on one side, is not quite the same as that on the other side. The hemispheres of the brain are seldom quite equal, the left being considered by many larger than the right, or placed symmetrically; and the convolutions of one hemisphere do not tally, in form or distribution, with those of the other. The lungs are not quite symmetrical in size, or in division into lobes. The heart and large blood-vessels are more aberrant still. The liver has its right lobe larger than its left, in the proportion of four-fifths to one-fifth. The gall-bladder is unsymmetrically placed. The alimentary canal has lost its original symmetry of form and position. The portal and systemic veins, and the lymphatic system, are all unsymmetrical.

As regards the pancreas and spleen, we ought, therefore, from analogy, to expect to find, on investigation, the operation of the same law of symmetry, with more or less deviation from it in the course of the development and growth of these organs. They ought, at their origin, to be, each of them, either single or double—and most of the internal organs are double; if single, they would belong to the median line of the body; if double, one half would belong to each side of that line; and this original symmetry ought, during growth, to be gradually changed to a kind of asymmetry, from which, however, the original form, however obscured, should be deducible.

Let us then see what our best descriptive anatomists say of these organs, what we can glean from the researches into their development, what we are told respecting them by the highest authorities on comparative anatomy, and draw therefrom a warrantable conclusion.

1. THE PANCREAS.—The extracts, subjoined in notes, will show the idea, up to the present time, entertained as to this gland.*

Passages to the same effect, from many authors who have written since the discovery of the pancreatic duct by Wirsung, in 1642, might be adduced, but those quoted will suffice to show that the prevalent

* Cruveilhier states: "The pancreas is a glandular organ annexed to the duodenum, with which it has immediate relations: it is situated transversely and deeply behind the stomach, and in front of the lumbar vertebra. In form it resembles no other gland; it is transversely oblong, flattened from before backwards, large at its right extremity, where it presents a sort of angular expansion like a hammer, and gradually tapering towards its left extremity; hence the division of this organ into a head, body, and tail."

Again: "The right extremity is curved upon itself from above downwards, like the duodenum, by the concavity of which it is circumscribed; then, having reached the third portion of the bowel, it passes transversely to the left behind the superior mesenteric vessels, and forms the posterior wall of the canal in which they are situated. This reflected portion, arranged in the form of a whorl, is sometimes detached from the rest of the gland, on which account it has been called the lesser pancreas." (*Anatomy*, vol. i; *Libr. Pract. Med.*, vol. vii, p. 531-2, 1842.)

According to Huschke: "Die Bauchspeicheldrüse . . . ist eine lange, zusammen-gesetzte körnige Drüse, die quer durch die Bauchhöhle hinter dem Magen vorläuft, in vieler Hinsicht mit den eigentlichen Speicheldrüsen übereinkommt und daher von ihrer Lage den passenden Namen erhalten hat." (S. T. von Soemmering, *Lehre von den Eingeweiden*, etc., von E. Huschke, fünfter Band, 1844, p. 164.)

Todd and Bowman call it "a large gland, placed across the spine behind the stomach, in physiological relation with the duodenum; its right extremity or head, much larger than the tail, lying close within the curve of the duodenum, and presenting a recurved extremity following the lower part of that intestine, and sometimes termed the lesser pancreas." (*Physiological Anat.*, 1836, vol. ii, p. 459-63.)

The late Dr. Hyde Salter, in the article "Pancreas", in Todd's *Cyclopædia*, writes: "The pancreas is an azgyos, non-symmetrical, glandular organ. From its elongated form it has been described by anatomists as possessing a body and two extremities—one, which is enlarged and clubbed, has been called the head; the other, tapering and acuminate, the tail; the middle portion, the great mass of the gland, being the body. Other describers have suppressed the body altogether, and described as the tail all that portion which is not included in the curved intumescence at the right extremity, which they designate the head. Indeed, the imaginations of anatomists have been largely drawn on to supply analogies whereby to illustrate the shape of this organ. Some have compared it to a hammer, some to a dog's tongue; among them all, I think the best is that which compares it to a pistol." (Vol. v, *Supplement*, p. 81, with figs. of varieties of pancreatic duct and other beautiful figs. from comp. anat.) In Quain's *Anatomy*, it is characterised as "a long, narrow, flattened gland, larger at one end than the other, and lying deeply in the cavity of the abdomen." "The lower extremity of the curved portion or head" is sometimes marked off from the rest, and is then termed the lesser pancreas." (Seventh edit., part iii, p. 881.)

idea has been, and still is, that the pancreas is a single, azygos, and unsymmetrical organ, and therefore an exception to the general rule of the viscera.

It is true that the results of the study of the development of the organs and their varieties are quoted by some authors in distinct and separate paragraphs, yet the "description" remains in the old stereotyped form, and there is nothing in it to lead the mind of the student to the knowledge that the pancreas is, or may be, a double, or in any sense, a symmetrical organ.

2. In the paragraphs placed below, which are taken from the works of developmental anatomists, it will appear that these distinguished men have looked upon the pancreas as originating on the median line of the body, and therefore, at the earliest period, when it appears to be single, as a symmetrical organ.*

The information obtained from these and other sources is scanty, but valuable. The pancreas arises in the post-peritoneal space at the lower part of the early mesogastrium, or the upper part of the early mesentery, either as the liver does, by the protrusion of a part of the posterior wall of the intestine, just below the stomach, into a previously existing mass of cells, out of which a tube with its branches, and all the accessory parts of a gland, are developed, or by the formation of a tube, etc., in the first place, by the agency of these cells, the tube gradually perforating the wall of the intestine from without inwards. However this may be, the opening of the tube, or duct, for the pancreas, is either coincident with that of the ductus communis choledochus, or situated a very short way from it.

The pancreas and the liver lie at first behind the intestine, which is then a straight tube, placed on the median line of the body; but, as that part of the tube corresponding to the future stomach and duodenum turns very early somewhat on itself, and towards the right side of the body, the budding glands will necessarily appear afterwards to lie on the left side of the intestine, but on the right side of the median line of the body.

The two viscera, as they grow out, are compelled to take different paths, after having together pushed on towards the median line and its left side. The liver then develops itself upwards, and towards the right side, then spreads itself forward and laterally, and lastly, downwards, thus clearing itself from the duodenum and pancreas, passing behind the stomach up to the diaphragm at the posterior region of the epigastrium and hypochondria, especially the right, and lastly, mounting up and extending forwards and downwards over the stomach, upper part of the duodenum, and a portion of the arch of the colon. The pancreas, in its growth, cannot follow the course of the liver; it is kept from proceeding upwards and forwards by that gland, by the stomach and the bag of the omentum, and it is restrained from a downward course by the third division of the duodenum. It develops itself, therefore, towards the left side of the abdomen, across the median line, and somewhat upwards, being pressed against the spine by the stomach and bag of the omentum; the stomach, at the same time, is extending itself towards the left, pushing, as its *cul-de-sac* bulges out, the spleen into the left hypochondrium. The upper part of the pancreas, growing on, assumes an elongated and flattened form, following the spleen, which, in the adult, it usually touches. The lower part (of the "head") of the gland increases also towards the left side of the body, until its further progress

is stopped by the third or ascending portion of the duodenum, and by the superior mesenteric vessels, which cross its path at right angles. It is therefore much shorter than the upper part of the gland, and is pressed against the right end of it, coalescing so as to be confounded with it, and contributing to give to the pancreas the form of a hammer, or pistol, and being denominated a protuberance, or mere accessory, or a reflection of the head of the gland—the lesser pancreas. This lower part of the gland may be absent; but, when present, which is very commonly the case, it always has its own proper duct, which either opens into the duct of the upper portion (the usual case), or penetrates the duodenal wall apart.

Taking this view of the development and growth of the pancreas, it is not difficult to believe that in man we have a two lobed, instead of an azygos gland, the two lobes being unequally developed.

3. *The Varieties of the Pancreas* in man are, perhaps, best indicated by the varieties of the duct, which are shown in the notes below.*

According to these extracts, the arrangements of the pancreatic duct in man may then, in passing, be thus stated.

a. It is single, and opens into the bile-duct just before this enters the duodenum.

b. It is single, and opens directly into the duodenum, apart from the bile-duct.

* Bartholinus says of the duct: *Unicus plerumque quamquam ab eodem duplex sit observatum, parallelâ lineâ invicem extensus.* (*Anatomia Bartholiniana*, Lugd. Batav., 1674.)

Winslow says: "The pancreatic duct is sometimes double in man, one lying above the other. It pierces the duodenum and opens into the ductus choledochus, commonly a little above the prominent point of the orifice of that canal; and sometimes it opens immediately into the duodenum."

"In man, I observed several years ago that, where the great extremity of the pancreas is connected to the curvature of the duodenum, it sends down an elongation, which adheres very closely to the following portion of the intestine; and, upon a careful examination, I found a particular pancreatic duct, ramified like the large one which ran toward and intersected this great duct, into the extremity of which it opened after having penetrated the duodenum. This portion I term *pancreas minor*, and it sometimes opens separately into the duodenum, in which we likewise observe several small holes round the ductus choledochus, which answer to the pancreas." (*An Anatomical Exposition of the Structure of the Human Body*. By J. B. Winslow. Translated by G. Douglas, M.D.; 1763; p. 208.)

J. and C. Bell say that "sometimes there are two pancreatic ducts; but more frequently that part of the gland next the duodenum, and which is called the round head of the pancreas, has an excretory duct peculiar to itself, which either opens into the duodenum separately from the main duct, by piercing the coats of the intestines nearer the stomach, and sometimes opens further down." (*The Anatomy and Physiology of the Human Body*, 1829, vol. iii, p. 334.)

Cruveilhier states: "The excretory duct is generally single, but sometimes double; and then there is a principal duct belonging to the body of the pancreas, and a smaller one for the reflected portion, or lesser pancreas." (*Op. citat.*, vol. i, p. 533-34.)

Again: "The pancreatic duct and the ductus choledochus open by a common orifice in the human subject. This arrangement is constant; and, when we find a pancreatic duct perforating the duodenum separately, we may be certain that there is another duct presenting the regular arrangement—at least I have never observed to the contrary. As to the precise situation of the separate opening of the supernumerary pancreatic duct, it may be either in front of, behind, below, or above the orifice of the ductus choledochus."

Huschke, as to the varieties of the gland, writes thus: "Es sind sehr wenige. Sie betreffen vorzüglich den Ausführungsgang. Durch Nichtvereinigung seines Endastes kann er doppelt und so gar dreifach werden, und der Bauchspeichel also an drei verschiedenen Orten in den Zwölffingerdarm sich ergießen. Ebenso kann er sich vom Gallengange trennen, oder beide sollen durch einen mittleren Canal vereinigt gewesen seyn."

Todd and Bowman (*op. cit.*) tell us: "It frequently happens that the duct belonging to the lower end of the curved portion, or lesser pancreas, opens separately into the intestine."

Dr. Hyde Salter (*op. cit.*) relates: "Occasionally the pancreatic duct is double throughout its whole length, the two running side by side, and communicating just before their junction with the ductus choledochus. Soemmering asserts that there are three ducts distinct throughout, and opening separately."

Again, at page 84: "Just before entering the intestine the duct commonly receives a large tributary branch, often nearly as large as itself, coming from the head of the pancreas. This occasionally remains permanently distinct, and opens into the intestine by a separate orifice—a condition always present, according to Meckel, in the early fœtus, so that this irregularity is essentially nothing more than an extension of a fœtal condition into adult life. When this duplicity exists, the separate duct from the head of the pancreas has its own little papilla, proportionately smaller than the normal one, and separated from it by about three-quarters of an inch or an inch. It is usually lower down, though sometimes higher up, than the main orifice. According to other authorities, however (Soemmering, *Corporis Humani Fabrica*), the pancreatic duct and the bile-duct will sometimes open on the mucous membrane of the duodenum by two entirely distinct orifices, when the former is single and there is no secondary one."

Quain's testimony is: "The duct increases in size as it advances towards the head of the pancreas, where among the larger branches it is usually joined by one from the lesser pancreas." As to the varieties, "sometimes it is double up to the point of entrance into the duodenum; and a still further deviation from the ordinary condition is not unfrequently observed, in which there is a supplementary duct derived from the lesser pancreas, or some part of the head of the gland, opening into the duodenum by a distinct orifice, at a distance of even an inch or more from the termination of the principal duct." (*Op. cit.*, part iii, p. 883.)

Herbert Mayo, speaking of the pancreas, says: "It has two ducts, the larger of which opens into the duodenum at the same point with the ductus communis choledochus; the smaller either opens into the greater, or into the duodenum at an inch distance from it." (*Outlines of Human Physiology*, 1833, p. 127.)

* From Kölliker we get the information that "The development of the pancreas commences by the formation of a diverticulum of the posterior wall of the duodenum, and in its further progress it exactly resembles the salivary glands." (*Manual of Human Histology*, 1854, vol. ii, p. 138; Sydenh. Soc.)

Todd and Bowman say that, "according to Reichert, the liver and pancreas of the embryo frog are developed from a portion of the yolk, which becomes separated from the general mass at an early period. . . . At first, there is no appearance of a division in this mass of yolk-substance. . . . Subsequently the two organs become more distinctly marked out." (*Physiol. Anat.*, 1856, vol. ii, p. 607-8.)

Gray, who has figured the liver and pancreas of the chick, says: "They seem to be developed from two separate protrusions of the intestinal tube about the ninetieth hour of incubation." (*Philos. Transl.* 1852.)

Quain says: "The pancreas appears earlier than the salivary glands, in the form of a small bud, from the left side of the intestinal tube, close to the commencing spleen." (*Anatomy*, seventh edit., 1867, part iii, p. 883.)

Again, at page 861, we find this passage: "The dilated portion of the (intestinal) tube which forms the stomach turns over on its right side, so that the border, which is connected to the vertebral column by the membranous fold (or true mesogastrium), comes to be turned to the left—the position of the tube being still vertical, like the stomach of some animals. By degrees it becomes more dilated, chiefly on what is now the left border, but subsequently the great curvature, and assumes, first an oblique, and finally a transverse position, carrying with it the mesogastrium, from which the great omentum is afterwards produced. Upon the surface of the part of the canal which immediately succeeds the stomach, and which forms the duodenum, the rudiments of the liver, pancreas, and spleen are simultaneously deposited; in connection with the two former, protrusions of the mucous membrane grow into their blastemic mass, and form the commencement of their principal ducts."

Mr. Pittard says: "The pancreas is an originally median organ, one end of which has been displaced, along with the pylorus, towards the right." (Article "Symmetry," Todd's *Cyclopædia of Anatomy*, vol. iv, p. 847.)

c. There are two ducts, one from the upper and larger lobe, the other from the lower, or lesser pancreas.

a. These coalesce and unite with the bile-duct.

β. One of them, that from the upper lobe, opens into the bile-duct; the other, that from the lower lobe, into the duodenum.

d. There are three ducts, distinct throughout, and opening separately into the duodenum. (Soemmering, as quoted by Dr. Salter, and Huschke, in the quotation given.)

All have their counterparts in the lower animals, as Tiedemann pointed out, but the varieties in animals are much more numerous than in man. No instances of four ducts in man are on record; three are very rare; two and one are common.

With regard to the lateral homology of the pancreas, when the gland and its duct are single, they belong to the median line, and then only is the organ azygos and symmetrical; except as to position, and, as Mr. Pittard, in the article "Symmetry," already quoted, says, "its anterior aspect is the left lateral homologue of the posterior." When double, the larger, or upper lobe, belongs properly to the right, and the lower lobe, though stunted, to the left side of the median line—a certain departure from symmetry, but one which recalls that of the liver, with its unequal lobes. When triple, the upper lobe is double and the lower single; a greater departure from symmetry, unless we conceive that the higher portion of the upper lobe belongs to the right side, the lower portion to the median line, and the lower, or lesser lobe, to the left side of that line, and then there will be symmetry. The second of these three instances, a double pancreas, is, I suppose, the normal, or at least the typical arrangement; but we do not really know in what proportion each instance occurs in any given number of cases. The occurrence of a double upper with a single lower lobe is paralleled, according to Dr. Hyde Salter, in the horse.

There appear to be no instances recorded of a double upper with a double lower lobe in man; but in birds a double lower lobe is extremely common, the upper lobe being either absent, or very imperfectly developed.

4. We must now turn to the *comparative anatomy*. The condition of the pancreas in *Pisces*, *Reptilia*, and *Aves*, is shown in the subjoined extracts from Dr. Hyde Salter's article, "Pancreas," already quoted.*

It is, however, in *Mammals* that the pancreas most closely resembles that in man; and the two following passages, one from Dr. Hyde Salter's article, and the other from Professor Owen's *Anatomy of Vertebrates*, vol. iii, 1868, are all that can be necessary to show the true morphology of this gland.†

From comparative anatomy, then, there can be no doubt that, on the whole, the pancreas has a considerable degree of symmetry, as much as that possessed by many other organs; that on the whole it is a double rather than a single organ; indeed, one may even venture to think that

* In *Fishes*, the gland presents itself in a great variety of numbers and forms of coecal tubes—either one, two, three, or more, constituting a single series on the median line, or a single or double series on each side of it, in the lower orders, or forming a concentrated compound racemose gland, with one or two terminal ducts, in the higher orders.

In *Reptiles*, it is more like the gland of the mammals; generally it is bifurcate, and, whilst one division is applied to the duodenum, the other is in contact with, or envelopes, the gall-duct. Its close contact with the spleen is only seen in the true serpents. In them it is always placed to the right of the commencement of the intestine and of the stomach. Its duct opens into that of the liver, or separately into the duodenum, and is almost always single.

In *Birds*, the organ has its duodenal part alone developed, and that is single, double, or triple. The ducts vary in number, and are most commonly one, three, or six, opening separately into the duodenum, and apart from the liver-duct.

† The former says: "The chief differences between the pancreas in other mammalia and in man relate merely to its colour, its consistence, its more or less marked division into lobes, its form, its volume, its union into a single mass, or its separation into two distinct parts. Its form is generally that of a narrow band, divisible into two portions—one, the duodenal, following the curve of the duodenum, and placed vertically or obliquely; the other, the gastro-splenic, extending transversely, and therefore opposite to the other, from the duodenum to the spleen, against which it always abuts. The latter is always developed; the former is often inconsiderable or suppressed, and must be considered merely as an accessory portion."

The latter states, that "this conglomerate gland" (in mammalia) "differs chiefly from that in birds by the progressive development of a part more or less distinct from that which is lodged within the loop or fold of the duodenum: such added part may be represented by that freely projecting end of a fold of the birds' duodenal pancreas which stretches towards the spleen; but there is no transverse part of the gland extending at right angles from the duodenal portion, like that which forms the splenic or transverse pancreas in the mammalian class, and which ultimately becomes the main part or body of the gland in them." In the lower classes generally there is a splenic and a duodenal lobe. "In the rodentia, these are diffused in small portions over a large space from right to left. In carnivora, the duodenal and splenic divisions are well marked and subequal."

Passing from the aye-aye, through the lemurs, the platyrrhine, to the catarrhine quadrumana and to man, the duodenal "or small pancreas" becomes more and more restricted in size relatively to the splenic division, and "is reduced to an enlargement called the head." The main duct of the gland "is commonly joined near its end by the duct from the lesser pancreas or 'head'; but the homology of this with the duodenal pancreas of lower mammals and birds is sometimes instructively exemplified by the independent entry of its duct into the duodenum."

the *Ideal Pancreas* should be represented as having four lobes, two belonging to each side of the median line, the splenic lobe being double in the horse, and sometimes in man; the duodenal double in birds generally.

5. The peculiar symmetry and the double character of the gland are both obscured, almost hidden in its adult form by the obliquely transverse position which it occupies, and by the mode of the distribution of blood-vessels and nerves to it. The pancreas, devoid of a special artery, receives its blood mainly from the hepatic on the right, and from the splenic on the left, and partially from the superior mesenteric artery on the under side; the hepatic supplying the upper part of the "head," and a portion of the "body;" the splenic the rest of the "body," and the "tail;" whilst the superior mesenteric is destined mainly for the lower part of the "head," or lesser pancreas, and for the duodenum. Thus the right, or splenic lobe, is not exclusively provided with arteries from the right, nor the left, or duodenal lobe, from the left side of the body; the provision, however, on each side, comes from the median line of the aorta, whence comes also the supply for the intestinal tract, including the stomach, and for the liver and spleen, all symmetrical organs.

The veins are less symmetrical even than the arteries; as to the lymphatics, there is little known of them.

The nerves of the pancreas are derived from the solar plexus, and from offsets of the right and left pneumogastric nerves, and, being placed upon and running with the blood-vessels, share the peculiar symmetry of their distribution. They come from both sides of the body, indicating that the pancreas is a symmetrical organ, belonging to both sides of the median line.

The solar plexus, in which the splanchnic and other sympathetic branches, and twigs of the phrenic nerves of each side join with offsets from both pneumogastric nerves, gives off the coeliac, and this again the gastric, hepatic and splenic plexuses, which, subdividing with the corresponding arteries, pass to the organs whose names they bear; and it is clear, from Quain, Hirschfeld, and other anatomists, taken together, that each of them most probably contains filaments from both pneumogastric nerves. We must also infer, from the same sources of information, that the pancreas receives a larger supply from the right than from the left pneumogastric, which would accord with the different dimensions of its two lobes; but yet we cannot say that the right vagus supplies the splenic, and the left the duodenal lobe.

What one would be led to expect, after reflecting on the mode of distribution of the vagi nerves to the other and better known members of the pneumogastric series, is that both lobes should receive twigs from both vagi, but that the splenic lobe should be mainly nerved from the right, and the duodenal lobe mainly from the left vagus; however, our present anatomical knowledge does not confirm such expectation.

The somewhat irregular distribution to the pancreas of vessels and nerves, may, perhaps, in some measure, be accounted for by the probable fact that the organ itself must have attained considerable dimensions, and assumed a good deal of its characteristic form and position, through cell-development, before its blood-vessels and nerves were laid down.

6. Taking into account, therefore, the analogy presented by the other organs of the body, and particularly by those of the pneumogastric series; the original position and symmetry, and the development of the pancreas in the lower, and therefore, probably, in the higher animals; the varieties of the gland and its duct in man; and especially its comparative anatomy; the only conclusion at which one can arrive is, that the adult human pancreas ought to be described in our text-books not as an asymmetrical organ, an exception to a general rule, but as being more or less symmetrical, almost as symmetrical as the liver. If it be azygos, it is not asymmetrical; if double, it is only not quite symmetrical in form, because one of its lobes is less developed than the other, and in position, because it lies across, and not along, the median line.

If we imagine the pancreas developed on the median line, either upwards or downwards, from its origin at the back of the duodenum, or backwards, if that were possible, it will at once appear to have a much more symmetrical aspect than it has in its normal position.

7. Lastly, is the shoulder-tip pain, such as occurs in liver-diseases, present in diseases of the pancreas?

The pancreas receives branches from both pneumogastrics, but these are less in importance than those received by the stomach, liver, or spleen, and the organ itself is much less in bulk than the stomach or liver; so that, if the shoulder pain should occur, it ought to be less frequently present, and less prominent, than in diseases of the stomach and liver. Then, again, pancreatic diseases are of themselves rare, and, when they do occur, are so obscure, and so usually associated with and masked by affections of the neighbouring viscera, that their diagnosis is very difficult, and often impossible.

The pain, however, may be reasonably expected to be occasionally present, in acute and painful diseases of this organ, in one or the other shoulder.

As the "head" of the pancreas is the part most commonly diseased, either the right or left vagus may be affected, according to the lobe attacked; or both nerves, if both lobes suffer.

There is confessedly no group of symptoms that can be relied upon as pathognomonic of pancreatic disease pure and simple. I have consulted all the authors within my reach to see if any had noticed the shoulder pain as one feature of the group. The usual account goes to show that the pain is seated in the gland itself, and radiates or extends to the spine, the wall of the chest—often on the right side, and running up as far as the lower part of the shoulder—radiations doubtless along the course of the nerves of the organ back to the solar plexus, and thence to the splanchnic and intercostal nerves, and to the spine.

The only authors who, to my knowledge, distinctly mention the shoulder pain in these diseases, are Dr. J. R. Wardell and Dr. G. Andral. The former, in the third volume of Reynolds's *System of Medicine*, states that, of inflammation of the pancreas, "the cardinal symptoms are a dull, heavy, aching pain, deep down below the centre of the epigastric region, which radiates through to the back, left shoulder, and left lumbar space, simulating the pain experienced in renal calculus." But this pain of the shoulder is not said to be in the top of the shoulder.

The pain in pancreatic, as in liver diseases, may perhaps be more frequently discovered on a more attentive and minute examination of the cases as they occur. I cannot say that I have myself had occasion to notice its presence. In splenic diseases, however, the pain is often present.

The latter physician, in his *Cours de Pathologie Interne* (tom. i, p. 167), gives the following case, taken from *Hufeland's Journal*, April, 1822. "Une villageoise, en 1820, mit au monde un sixième enfant. Immédiatement après la délivrance elle fut saisie d'une fièvre grave. La malade était pâle, émaciée, exténuée par des sueurs abondantes et une continuelle salivation, avec éruption d'une liqueur filante, jaunâtre, sans odeur ni saveur. La quantité de ce liquide sécrété dans vingt-quatre heures dépassait deux livres; la bouche et le gosier présentaient un aspect naturel; tantôt il y avait constipation, tantôt diarrhée, et les selles alors étaient semblables aux mucosités rendu par la bouche. Anorexie, grande soif qu'on ne parvenait à calmer qu'en humectant souvent la bouche, car la plus petite quantité de boisson occasionnait des spasmes de l'estomac. Le soir, exacerbation de la fièvre. En outre, douleurs pognitives et transitoires dans la côté gauche de la poitrine, toux sèche, fréquentes palpitations, syncopes au moindre mouvement. La malade éprouvait dans le dos des douleurs qui se propageaient jusque dans l'épaule et le bras droits: sentiment de pression à la région précordiale," etc.

The patient fully recovered in three months, and bore another child.

These citations are not, it must be confessed, very satisfactory. Further and more minute observation may give us sufficient pathological proof that the pancreas really belongs to the pneumogastric series of organs, and that its morbid influence may be extended to one or other shoulder-tip.

THE ANTICIPATION OF POST PARTUM HÆMORRHAGE.*

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It is now more than twenty years since I read a paper before the Medical Society of Liverpool, in which, as I believed, I demonstrated to that Society the fact, that the probable occurrence of *post partum* hæmorrhage in any case of parturition could be diagnosed beforehand, and, being diagnosed, could be prevented. If this assumption be sound, you will readily admit that this cannot be too widely known, and that it is a reproach to the profession that we still occasionally hear of cases of death from *post partum* hæmorrhage. Very early in my career in the practice of obstetric medicine, I observed that cases of parturition in which *post partum* hæmorrhage occurred, were always marked by the pains during labour being of a peculiar character. Having my attention directed to this point, I further observed that *post partum* hæmorrhage never occurred in any case of labour in which this peculiar character of the pains was absent. The pains are of this kind: they are strong and quick; they do not gradually culminate into a strong pain and subside again, but they are sharp, quick, and cease almost

suddenly; and the intervals between the pains are long in proportion to the length of the pains. In an ordinary case, for one or two hours before the completion of labour, the intervals will average about three times the length of the pains; i.e., if the pains last each from fifty to sixty seconds, the intervals will average a little less than three minutes. Now, if the pains last each only from forty to fifty seconds, and are of the sharp character I have described, with intervals lasting five or six minutes, though the labour may proceed steadily and the head advance a little with every pain, you will be sure to have hæmorrhage after delivery is completed, unless you anticipate it by altering the character of the pains, in making the pains longer and the intervals shorter. It is very easy to understand how this comes to be the case: the uterus is contracting sharply, and then becoming fully relaxed; after the child is born, a relaxation follows; one or two sharp pains expel the placenta with a gush of blood, and the uterus again relaxes, continuing the same tendency which existed before the delivery of the child.

Some of my friends will say that this may be very well, but that all this may be prevented by carefully attending to the maintenance of a steady contraction of the uterus by following down the expulsion of the child and placenta, and keeping the uterus firmly grasped until all danger of relaxation has passed away; that, by attending to this point carefully, during an experience of many years, they have never had a serious case of hæmorrhage. But I would warn them that, no matter how long, through good fortune or good care, they may have escaped this painful trial, they never know when they may happen to fall in with a patient of weak, flabby fibre, and low nervous power, in whom they may find it impossible almost to induce active uterine contraction in time to save her from the effects of the hæmorrhage.

Having recognised the necessity for interference in any case as soon as the os is fully dilated, I give a full dose of ergot. If this do not improve the character of the pains at the end of an hour, or thereabouts, I repeat it; I scarcely ever find a second dose necessary. In dealing with primiparæ, caution is required, first, not to administer ergot until the soft parts are pretty well dilated as well as the os uteri; and the drug should be administered in much smaller doses, as it sometimes acts with unusual energy in primiparæ. Generally, in about twenty minutes or half an hour after the ergot has been administered, the pains increase in length and frequency, and when the labour is over, the uterus maintains a good contraction. The ergot which I use is a liquid extract twice the strength of that of the *Pharmacopœia*, of which I give a teaspoonful when I think a full dose is indicated.

I have pursued this practice now for more than twenty years. During this time I have attended 3,750 labours, and among them I have had one case of *post partum* hæmorrhage; that case occurred about three o'clock one winter's morning, when I happened to have no ergot with me. I foresaw that it would happen, and was able to prevent its being very serious by adopting the ordinary means.

If the gentlemen around me will look out for these cases in their own practice, I am sure they will occasionally recognise them, and by adopting the means that I suggest, they will secure the safety of their patients, and at the same time relieve themselves from a constant cause of anxiety.

I feel that, by this discovery, I have eliminated from my own practice the danger of *post partum* hæmorrhage, and I earnestly urge you all to try and verify for yourselves the hint which I now offer you.

CLINICAL MEMORANDA.

LARVÆ IN THE EXTERNAL EAR.

AN elderly lady complained of uneasiness and irritation in her left ear, and was advised to syringe it well with warm soap and water. On doing so, a number of live maggots, about the sixth part of an inch in length, were expelled from the meatus. I brushed the interior of the canal with a mixture of sulphurous acid and glycerine, and again used the syringe, when some more maggots were washed out, dead. The irritation not ceasing yet, I repeated the application, and two days later one very large maggot crawled out. A further use of the acid and glycerine, followed by copious syringing, brought away a large quantity of minute eggs, after which all the unpleasant symptoms vanished. No ulceration was to be observed in or about the tympanum, nor any apparent inducement for the presence of the maggots. Some insect—probably a fly or "blue-bottle", must have found its way into the meatus during sleep, and there deposited the eggs.

LOUIS LEWIS, M.R.C.S.

* Read before the Obstetric Medicine Section at the Annual Meeting of the British Medical Association in London, August 1873.