The gastritic changes concurrent with gastric ulcer and carcinoma are of great interest, and it has even been suggested that their study may enable us to foretell the later onset of ulcer and carcinoma. This, perhaps, is unduly optimistic, at any rate as far as carcinoma is concerned, but the study of the relief pattern may shed some light on the factors at work. Another interesting field of study is provided by the cases of gastritis following gastro-jejunostomy.

PEPTIC ULCER

In the skeleton meal, as in the full meal, the direct evidence is given by the actual niche. There are both advantages and disadvantages in the former procedure; it is sometimes difficult to fill the niche when the main cavity of the stomach is empty. On the other hand, in ulcer of the cardia, and in ulcer of the corpus away from the sky-line of the lesser curvature, as well as in pyloric and pre-pyloric ulcer, the filling and visualization of the niche is often very much easier in the skeleton meal. The conditions of the mucosa around the ulcer can also be studied. Barclay has emphasized the fact that the apparent size of an ulcer depends on the heaping up of the mucosa around it; so the decrease in size of a niche under treatment can be misleading. The presence of radial striae in the mucosa converging on the site of an ulcer is another valuable sign. Duodenal ulcer can often be diagnosed by the skeleton meal, but the best method is that described by Akerlund, Attinger, and Berg. This is, to fill the duodenal cap completely by pressure on the stomach and on the descending duodenum. The cap is then examined at all possible angles for contour deformities, and then completely emptied by compression or manipulation and examined again for any residue in a niche. The skeleton meal is especially well adapted for the diagnosis of jejunal and gastro-jejunal ulcer, and also for the differentiation between ulcer and diverticulum. Fig. 2a shows a small ulcer niche on the lesser curvature,

with interruption of the mucous folds from infiltration; Fig. 2b shows a small diverticulum of the lesser curvature with normal folds running into it.

CARCINOMA

The patient with carcinoma of the stomach too often has a well-marked filling defect by the time he comes for investigation. In such a case the examination of the completely filled stomach often gives an easy diagnosis. The skeleton meal here finds its application in determining to what extent the growth has penetrated into the stomach walls beyond the actual filling defect, and it may give valuable information as to the mechanical, as apart from the metastatic, possibilities of resection. It is also of value in the diagnosis between chronic callous ulcer and the malignant ulcer; according to Haudek and Barclay the mucous membrane is abruptly cut off in carcinoma, while in simple ulcer it has an infolded appearance. It is probable that a break in the relief pattern

caused by a growth could be recognized long before the formation of a filling defect. Striation of the mucous folds "against the grain" is considered by Berg to be an early sign of carcinoma; I have seen it in the neighbourhood of an early growth.

Fig. 3a shows the relief pattern in a case in which the growth had penetrated far beyond the filling defect; the

extension in the gastric wall is seen high in the cardia, while the filling defect is low in the body. Fig. 3b shows the pattern in a case that had a large filling defect in the corpus; the mucous folds of the upper third of the stomach are seen to be free from invasion; partial gastrectomy was successfully performed.

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THE SHAPE OF THE PELVIC BRIM AS THE DETERMINING FACTOR IN CHILDBIRTH*

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Those who practise midwifery in the East, whether in India or in China, are soon aware of the fact that under certain conditions of life childbirth is easy and safe, while the opposite conditions render it difficult and dangerous for both mother and child. The field worker, the woman who lives out of doors tending the cattle, planting out crops often knee-deep in cold water in the rice-fields, rowing the heavy boats used for transporting grain, the tent dwellers—such as the women of the nomadic tribes on the North-West Frontier of India—all these have

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their children safely and with no more difficulty than the animals around them have in parturition. On the other hand, the city dwellers, and especially women who on account of the custom known as "purdah" must remain in seclusion and live indoors from 8 years old and onwards—these women find their confinements increasingly difficult and dangerous for themselves and their offspring. In China, the women who bind the feet are the class from which the difficult obstetric cases come.

That it is not a racial question, but due to a certain manner of life is seen when, on inquiry, one finds that women of the same race and even of the same family in open-air surroundings have easy confinements, while part of the family who have migrated to the town after some years suffer as the townspeople do. The negress provides a good illustration. In her natural surroundings she gives birth to children with ease, but in America, living in big cities such as New York and Baltimore, Whitridge Williams tells us she has more obstetric difficulties than the American white woman herself, and he suggests that this must be due to something in the manner of life in the crowded quarters of great cities.

In the Carnegie Trust Report for 1917 we read of easy labours and large families among the Highland women who, bare-footed, haul in the nets with the men, follow the plough, and engage in field work, and mention is made by local authorities of the tinker women who live in tents and whose custom it is to be delivered safely and rapidly by the roadside before any doctor or nurse can be called to assist. Strong contrast, this, to the maternal mortality rate and the infant death rate to be met with in cities such as Edinburgh and Glasgow. In England we still have our gipsies and canal-boat women, with their large families and easy and safe confinements, and yet our maternal mortality rate shows no decrease in the last twenty years, and industrial towns like Swansea, Cardiff, Barnsley, Bradford, and Rochdale head the list with their maternal death rates.

The fundamental cause of difficulty is obvious: that for some reason the child's head and the mother's pelvis do not fit, and delayed and difficult labour is the result; bruising of soft parts, exhaustion of the mother, the risk of sepsis—all these things follow on this primary failure of adaptation. Is the foetal head too big or the maternal pelvis too small?

In the hope of getting some light on this problem I consulted Sir Arthur Keith, who told me he thought that undoubtedly the heads of the race were getting larger among civilized peoples, but the pelves of the race did not seem to keep pace with them. With his permission, therefore, I was allowed to examine and measure any specimens I wanted at the Royal College of Surgeons.

There were two factors to be considered: (1) the unyielding pelvic brim of the mother; (2) the yielding foetal head which passes through the brim.

THE BRIM OF THE PELVIS

It was at once noticeable what a variety of shapes the female pelvic brim assumed—kidney-shaped, oval, round, Y-shaped, and irregular, or one side larger than the other. Verneau in 1875 published a treatise on variations of pelvic shape as regards both sex and race, but he found, like our obstetricians of to-day, that the female pelvis was subject to such extreme variations in shape, *even in the same race*, that in the end he confined his observations almost entirely to the male pelvis among the different races of mankind. But my object was to find the area available for the passage of the foetal head through the brim. A piece of string was used and carried round the brim following the ilio-pectineal lines, then across the back of the pubic symphysis, and, in order to keep in the

plane of the brim, it was carried across the sacrum just below the promontory.

It is obvious that the same circumference arranged as a circle encloses a larger area than the same boundary line arranged in any other form, and that, circumferences being equal, the shape of the brim determines the capacity of the pelvis. How did the pelves vary from the circular form? The European—Englishwoman, Frenchwoman, and Russian—were flattened from before back, having the long diameter transverse. Then there were pelves whose brim approached the circle, and finally the Andaman Island female specimens 1216, 1212, 1213, the Bushwoman 1311, the Sikh woman 631 B, Peruvian f 1013, South Australian f 1068.15, and Negress f 1256.51, whose transverse and antero-posterior diameters are of equal length, and consequently the pelvic brim is a perfect circle. There were also innominate bones, one from Ur of the Chaldees, one from Salisbury Plain (Ancient British), and an Anglo-Saxon specimen, where the great roundness of the ilio-pectineal lines was so marked that one was led to conclude that the more primitive the habits of the life the more circular the pelvis. All these people must have borne children safely without doctor or midwife.

Turner, writing in 1866, regarded all pelves as circular if they had an index 90:100, but he dismisses such as belonging to a lower grade of civilization than the European. But are the differences in form really racial? They are not, for it was at once apparent that the round-headed race, such as the European, is born of the oblong or kidney-shaped pelvis, while the long-headed race, such as the Bushman, is born of the round pelvis, so that the variations in shape of the female pelvis serve no useful purpose. Besides, Lynch in America published x-ray studies of parturition showing that the head passing through an oval brim left the ends of the oval empty, and when we consider

THE FOETAL HEAD

we find that, unlike the pelves, which differ in shape so widely even in the same family, the part of the infant's head which engages in the pelvic brim is a circle, among all people of whatever race, whether they are dolichocephalic or brachycephalic. This is the part we know as the suboccipito-bregmatic circumference, which in full flexion is brought into the maternal brim; and it has recently been shown that it is in this plane, and in this plane alone, that the foetal head can safely be diminished in volume, while still preserving its circular form. Unequal pressure or pressure in other planes leads to tearing of the tentorium and haemorrhage, one of the commonest causes of stillbirth and also of feeble-mindedness. We are reminded of a cup and ball—any departure from the circular, however slight, in the cup, will prevent the ball from entering, and so a measure just sufficient to encircle the child's head will prove inadequate if it is out of shape in the least degree.

In England and America want of light, and incorrect food, show themselves first by decalcification and decay of teeth, so that rickets must be almost universal, and, as we know, affects the bone most where growth is most rapid and calcification is proceeding most quickly. Such a part of the body is the pelvis. At puberty the brim measures more than seven times what it did at birth. It would take too long to recall the stages of development of the pelvis in detail, but we must remember that at birth it consists entirely of cartilage, containing forty-eight active centres of ossification. Shortly before puberty the three portions of the innominate bones fuse.

SACRO-ILIAC JOINTS

Duncan pointed out that pelvic development was influenced by the sacro-iliac joints, and we know that ankylosis of these joints produces atrophy of the pelvis,

and that where only one sacro-iliac joint is affected, the pelvis fails to develop only on the ankylosed side, and the earlier this morbid change takes place the more complete is the deformity produced. Whitridge Williams and Merkel have both testified to the rapid growth of the pelvis in girls just before puberty, and they draw attention to the fact that it chiefly affects all the parts near the sacro-iliac joints.

In handling the pelves at the Royal College of Surgeons, I noticed how well developed the sacro-iliac joints were in native races. All circular pelves have this joint well developed. In all these the knob or boss on the auricular surface of the ilium was well marked and the articular surfaces extensive. Havelock Charles in 1894 showed how the influence of function has modified the Punjabi sacro-iliac joints, producing a larger articular surface, which, he says, is common to all Oriental races and is similar to those found in prehistoric man.

There should be in all men and women, as in Orientals, a mobility of this joint and a constant change of pelvic inclination as the subject walks, runs, sits, stands, or crouches, and the immobility of the joint leads to serious changes in pelvic shape. The squatting posture used by both men and women while sitting, and also when attending to the calls of nature, was, of course, also employed by primitive man for the same purpose.

In adults I find that the two halves of the pelvis can be seen and felt to move apart with change of posture. This can be tested by noting the position of the anterior superior spines and the tubera ischii—first in the tiptoe position as if preparing for a dive, and again in the squatting position. The whole pelvis is expanded to its utmost capacity in the squatting position, and this is most marked while the component parts of the innominate bones are still cartilaginous—that is, at any time before puberty.

It is the swing of the sacrum between the innominate bones that influences the final shape of the pelvic brim, which should be a circle. In India, when the girl has lived a confined life and has sat in a more or less crouching position for years, one often sees the antero-posterior diameter of the pelvis lengthened at the expense of the transverse, and St. John Brooke in Africa notes the change in pelvic shape in Zulu girls due to a custom prevalent among them of sitting so that their weight is borne on one thigh only.

In England the still soft pelvis is bent by long sitting at school, and this is not counteracted as it should be by the proper action of the sacro-iliac joints, which should be used daily, if only during the acts of defaecation and urination. The wearing of high heels also limits and cramps their movements, the body weight is thrown forward on to the arch of the foot instead of the heel, the pelvic angle is altered, and the back unduly hollowed to preserve the balance. That these facts are the real explanation of our increasingly difficult maternity is clearly seen when we compare them with conditions where motherhood is still natural and easy.

Observe the habits of the Indian woman, of the Shetland woman, the tent dwellers, the boatwomen, the tinkers, and the gipsies—in fact, of all those who live natural lives out of doors and exercise their sacro-iliac joints by hard manual labour, digging, weeding, hauling in nets, carrying and lifting heavy weights, and, more important than all, the daily crouching posture used in attending to the calls of nature. This posture is really the natural and only satisfactory one, and all these people are without the modern closet and most of them without chairs. The infants are breast-fed, later they have coarse but natural and fresh food. They roll and kick and tumble and squat and climb and run as much

as they like. Their elders have perfect teeth—the only really satisfactory evidence of the absence of rickets in a community. Maternity is consequently easy, the balance of the sexes well preserved because the larger-headed children are not destroyed by injury during birth, and the feeble-minded are not made, as so often among us, by the *successful* attempt to force a round head through an oval pelvis.

CONCLUSION

To sum up: maternity is a natural function and is easy and safe when the pelvis of the race fits the head of the race. The misfit is due to loss of area in the pelvic brim owing to a circle being bent into an oval. The change is caused by rickets and disuse of the sacro-iliac joints before 14 years of age. Perfect teeth are found with the round pelvis, and this is well understood among primitive people, who consider such teeth essential in a bride.

[The paper was illustrated by tracings and specimens, and a preparation to show the movements of the sacro-iliac joints.]

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SPONTANEOUS HAEMOPNEUMOTHORAX WITH UNUSUAL POST-MORTEM FINDINGS

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Haemopneumothorax is not a common condition. The majority of cases follow trauma either in military or civil life, but the spontaneous form is distinctly rare. After a close scrutiny of the literature of the past thirty years we have only been able to find eight recorded cases, of which five occurred in this country. Dr. Newton Pitt,¹ who recorded a case in 1900—almost identical with the case described below—stated that “there is no reference to haemopneumothorax in the Index Catalogue of the United States Library, nor is it discussed in any of the standard treatises on medicine in either English, French, or German,” and at that date he could find only one case in the literature unassociated with trauma. Most modern textbooks make no mention of this condition, and no post-mortem examination of a spontaneous haemopneumothorax is to be found recorded since Newton Pitt¹ and Sir Humphry Rolleston² reported two to the Clinical Society of London in 1900.