a percussion wave, which, arising at the aortic orifice, *quodam modo*, courses through the arteries at the rate of about 7 metres per second, whereas the blood stream is never faster than 0.5 metre per second.*

It must be obvious that these two velocities cannot be effectively harnessed to the end of one co-operative act. That which the finger on the artery takes note of, then, is the passage of a wave, and the impression gained is that of a lift, which is confirmed by physiologists, who teach that in the act of passing the artery is *expanded and lengthened*. Evidently the wave carries force.

Now let us take the stage of equipoise between the intra-arterial pressure—that is, the pressure caused by the arterial elastic recoil—and the opposing manometer pressure, when stasis supervenes; the pulse wave will, of course, present itself as usual at the mouths of the arteries, which are all open. Will it enter as usual? Why not?—it carries force; what is there to forbid? Well, there is no current to carry it. The answer to this is, it needs no current; it is not conveyed; it rides the blood stream and forces its way. We know that the percussion wave started by the cast of a stone travels as freely along the surface of a standing pool as over the smooth surface of a river, and in all directions, even against the stream. It will, therefore, enter and must reach the wrist, as usual, since the elasticity of the containing walls is not exhausted.

And now let us give another squeeze of the ball; the manometer rises, say, 10–15–20 mm., but the pulse is suddenly gone—why, if the arteries are still patent? For

* Compare Starling, op. cit., fourth edition, p. 813; also Wiggers, *Circulation in Health and Disease*, 1923, p. 190.

ILEO-CAECAI VOLVULUS FROM ADHESIONS FORMED BY LEFT-SIDED PELVIC APPENDICITIS.

BY

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THE following case is of interest in regard to diagnosis and development. Moreover, it is a commentary on the dangers of incomplete anchorage or fixation of a viscus that has been hitherto free.

The patient, a spinster aged 33, was admitted to hospital as an acute abdominal emergency. Twelve hours previously she had been seized by violent gripping pains in the left lower abdomen, accompanied by vomiting. No flatus had been passed since the onset of the attack, and the bowels had moved on the day before the attack. There had been no menstrual irregularity. There was a history of chronic constipation and occasional attacks of indigestion, confined to the region of the left iliac fossa.

The patient did not look ill. The temperature was normal, and the pulse rate 96 per minute. The tongue was furred. The abdomen was scaphoid and characteristic of the slender congenital viscerotopic type of anatomic structure. It moved freely on respiration, and some distension was present. The patient complained of pain in the left iliac fossa. There was deep-seated discomfort on pressure in this situation, but no tenderness or muscular rigidity. Pelvic examination was negative, as also was the obturator test for pelvic appendicitis. Succussion was present about the umbilicus, a sign of the greatest importance in the early stages of obstruction of the small intestine.

The case was regarded as one of acute intestinal obstruction. The abdomen was opened by a mid-line infra-umbilical incision. Coils of ileum, moderately distended, were packed off. The pelvic colon was empty. The caecum and appendix were not in the right iliac fossa. The ascending colon, longer and much more mobile than the normal, being provided with a mesentery, was traced into the pelvis. The caecum was lying in the true pelvis, distended and completely filling it. Attempts to extract it from the pelvis were resisted until adhesions binding down the appendix to the left side of the true pelvis had been divided. In delivering the incarcerated caecum a volvulus of the ileo-caecal segment of the bowel was discovered. Rotation in a clockwise direction had taken place through more than half a circle, round the axis of the appendix, adherent to the left side of the pelvis. The bowel was quite viable. After correction of the volvulus the appendix was removed and caecal plication performed. The patient made a good recovery.

the simple reason that this new rise of extravascular pressure, caused by the squeeze of the ball, will then have sufficed to meet and cancel the expanding force value of the pulse wave; the arterial wall will thus be prevented from yielding and the wave cannot pass, though the channels are all open. This is the reasoned explanation now proffered to show that it is not necessary to invoke obliteration of the artery, to account for the extinction of the pulse at the wrist, in the process of taking the blood pressure; and in the foregoing I have endeavoured to demonstrate that on physical grounds the obliteration hypothesis is untenable. It remains that the reasons advanced should be tested.

Bacon has said: "*Visio oculorum melior est quam progressio animi*," which I suppose may be rendered "the sight of the eyes is better than the mental process"—that is, ratiocination—and one must agree that a simple act of perception would save much excogitation and debate. But in the absence of sight by the external eye (for who has seen the closed artery?) what remains but the mind's eye to probe the validity of a hypothesis which is, as it stands, a pure assumption?

It has been said that the subject is not merely academic in that it raises a definite practical issue—namely, that from the beginning of the use of the sphygmomanometer—on the assumption of arterial obliteration, it has been a moot point what proportion of the pressure readings is to be allotted to the intra-arterial tension, and what to the resistance of the arterial wall itself (this latter a very variable quantity, when in disease the artery becomes thickened and hardened). Persistent patency of the arteries would eliminate this question once for all.

The caecum and ascending colon were extremely mobile in this case, being provided with a long mesentery. Such a state of affairs is not uncommon in the slender congenital viscerotopic type of individual. The caecum was thin-walled, atonic, and dilated, thus showing commencing failure of compensation, from long-standing difficulty of emptying. The appendix was cicatrized in its terminal portion, and the lumen in the distal half nearly obliterated. Obviously it had been affected by former inflammation. The previous attacks of left-sided abdominal pain supported this finding. Ultimately the appendix became fixed by adhesions to the left side of the pelvis. The hitherto mobile caecum became thereby insecurely tethered, and volvulus of the ileo-caecal segment took place.

Interest in atypical cases of appendicitis is sometimes associated with abnormal positions of the caecum and large intestine due to errors of rotation and fixation. The errors of mal-rotation and non-rotation of the midgut loop are those most likely to undergo volvulus change, and are usually, though not always, met with in the childhood period. In the adult it is the errors of the third stage of rotation, in which the viscera find their ultimate position of fixation to the posterior abdominal wall, that occur. Premature or high fixation of the caecum or failure in elongation of the colon results in an undescended caecum. Appendicitis in such a case may be difficult or impossible to distinguish from cholecystitis. Deficient fixation or abnormal elongation of the colon results in the low pelvic type of caecum. In the present case the attacks of appendicitis were atypical, being pelvic and left-sided. Intussusception in childhood and visceroptosis in the adult are intimately associated with this type of anatomical structure. Ileo-caecal volvulus is also associated with a low pelvic type of mobile caecum. To the incomplete fixation of the caecum produced by the adhesions around the appendix is to be ascribed one of the exciting factors concerned in its production in the present instance.

The case is an interesting example of an anatomical structure varying quite definitely from the normal, but which functioned fairly well until the introduction of another factor led to serious risk to function and to life. Nature's incomplete efforts at "caecopexy" were certainly disastrous in this case. May it not be argued, therefore, that fixation operations are essentially unphysiological in congenital visceroptosis? It seems to me that they are based upon an incomplete understanding of the altered anatomical structure and function of the individual as a whole. General methods of physical education and support would seem to meet the need in the majority of cases.