

period mentioned. Of these, 46 failed to carry on the treatment which was prescribed, and were lost sight of. The remaining 62 have been kept under observation and followed the treatment with more or less consistency, and have all recently reported as to their present condition. The interval which has elapsed since the initiation of the treatment averages in these cases 2.1 years, and of this number (62) 36 were males and 26 females.

The ages have been arranged in decades, and as no cases under twelve years of age were treated, there were no representatives of the first period. Twenty-seven cases were from 10 to 19 years of age; 14 cases from 20 to 29; 12 cases from 30 to 39; 4 cases from 40 to 49; 3 cases from 50 to 59; 2 from 60 to 69.

*Duration of the disease.* — When first seen 18 of the cases had suffered from deformity or other symptoms for a period of one year or less; 16, 1 to 5 years; 11, 6 to 10 years; 6, 11 to 20 years; and 4, above 20 years.

*Complications.* — In 20 cases there was one or more discharging sinuses at some period of the disease. Of these 20 cases at last report, 8 were improved, the sinus having closed in almost every case; 4 were in poor condition; and 8 were dead.

In 11 cases paraplegia to a varying degree occurred at some period in the disease. At last report the paralysis had disappeared in 7 cases; in 2 this facture was not noted; and 2 were dead.

*Results.* — At last report 20 were entirely free from symptoms, and the disease was apparently quiescent, with resulting deformity of varying degree. In 18 cases the condition is greatly improved, but in 13 cases there has been no improvement, and the present condition of the patient is poor. Eleven of the cases are dead. Two of these, both of many years' standing, died of intercurrent affections, and of the remaining 9, the cause of death in 4 cases was given as Pott's disease and in 5 as Pott's disease and phthisis. Of the fatal cases, 2 were between 10 and 19 years, 4 between 20 and 29 and 5 between 30 and 39 years of age. The shortest interval from the first symptoms to date of death was less than one year, the longest six years, the average four years. Five were complicated by phthisis, 2 were paraplegic and in 5 there was abscess formation with accompanying discharging sinus.

*Conclusions.* — The report represents a consideration of all of the cases of Pott's disease which applied to the Orthopedic Department of the Carney Hospital prior to 1902. In all there are 108 cases, of which number 62 reported more or less regularly for treatment. Of this number (62) 41 were under 30 years of age, and in 21 of the cases the disease had existed for from 6 to 20 years before applying for treatment. In 20 cases there was abscess. Of this number 8 died and 4 are at present in poor condition.

In 11 cases there was paraplegia, and of this number 2 died.

Of the 62 cases 11 died, and in nearly all death was due to the extension of the disease locally or to some other part of the body, the average time

between the onset of the disease and the time of death being four years.

In considering the report it is to be remembered that the cases here studied are entirely hospital patients, living for the most part necessarily under poor hygienic conditions. A similar number of private cases studied would possibly and probably show more favorable results.

#### A NOTE ON THE ASSOCIATION OF A RISE IN SYSTOLIC BLOOD PRESSURE WITH THE ONSET OF PERFORATIVE PERITONITIS IN TYPHOID FEVER.

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DURING the past two years I have frequently observed a sharp rise in systolic blood pressure, as measured by a modified Riva-Rocci sphygmomanometer, occurring in patients undergoing laparotomy, and produced by mechanical irritation of the peritoneum. Dr. Harvey Cushing suggested that a similar rise in blood pressure might possibly be produced at the onset of intestinal perforation in typhoid fever, by the mechanical and chemical irritation due to the extravasated bowel contents, and might prove of value in the early recognition of typhoid peritonitis. It was soon found, from the observations of Dr. Cook and myself, that patients suffering from acute general or rapidly spreading peritonitis, from whatever origin, uniformly showed, unless in moribund condition, a state of hypertension of the pulse. Similar observations have been made and reported by Dr. G. W. Crile,<sup>1</sup> and the association of high systolic blood pressures with general or rapidly extending peritonitis may be regarded as a constant one. It remained to study the development of the increased pulse tension in these conditions, and with that object in view we have in the past year kept a close watch on the state of the blood pressure in many of the typhoid patients admitted to Dr. Osler's service in the Johns Hopkins Hospital. In two patients, out of a large number followed, abdominal symptoms justifying exploratory laparotomy have arisen, and the relation in each of these of the symptoms to the blood pressure has been of the greatest interest. It is with the idea of stimulating further observations along this line during the approaching "typhoid season" that brief notes of the two cases are here reported.

**CASE I.** The patient was a young white man, admitted about the end of the second week of a typical attack of typhoid fever of considerable severity. His condition was not good, and he soon became delirious. The temperature was high, there was no diarrhea and no intestinal hemorrhage. The abdomen was soft and natural, and remained so during the ten days following admission. During that time from 20 to 200 measurements of systolic blood pressure were made each day, for purposes not connected with the present subject. The pressures ranged from 98 to 115 mm. Hg., with a general downward tendency as the disease progressed, and never rose as high as 120 mm. Hg., except within the hour

<sup>1</sup> Journ. Am. Med. Assoc., May 9, 1903.

following the administration of strychnia hypodermically. At 8 P.M. on the night of Jan. 16, the blood pressure was found to be 106 mm. Hg. At midnight it was 144 mm. Hg. (same observer), the patient's abdominal condition being the same as it was four hours earlier, — absolutely negative with regard to pain, tenderness, rigidity of the muscles or distention. At 4 A.M. the next morning the patient cried out suddenly with severe pain in the abdomen, and was found with knees drawn up, restricted respiratory movements of the abdomen, great tenderness over the right lower rectus muscle and some muscular rigidity at the same point. The signs developed rapidly, and about five hours later laparotomy was done, two perforations being found low down in the ileum. There was rapidly spreading peritonitis with some pus in the pelvis. There had been no sudden drop in the temperature, and the leucocytes had shown no change in frequent counts. The blood pressure remained high, falling slightly in the hours just before operation, but never approaching its pre-perforative level.

**CASE II.** A young white woman, very well nourished and with slight general arterio-sclerosis, in the fifty-seventh day of a severe attack of typhoid fever. For six weeks the blood pressure had been carefully followed, and had ranged between 104 and 125 mm. Hg., following a rather high level for so severe an attack. Three weeks before the patient had several intestinal hemorrhages. She had passed through one intercurrent relapse, and at the time of the development of grave abdominal symptoms was at the end of the first week of a relapse following two days' apyrexia. Temperatures had been very high, the pulse rapid, and there was slight tympanites; there was low muttering delirium, especially at night, but the patient could be roused to answer questions intelligently. For some days there had been occasional complaint of abdominal pain, never at all extreme, and there had been some tenderness on deep palpation, never well localized. Leucocytes had ranged constantly below 7,000. During the night of the fifty-sixth day there was sudden rapid increase in the abdominal distention. The complaint of pain in the abdomen became more constant and insistent, and the tenderness on palpation increased markedly, while remaining fairly general. The thighs were not flexed, and there was no outcry, and apparently no paroxysmal pain. Abdominal distention progressed, and could not be relieved by turpentine by mouth and locally applied, nor by enemata. The pulse rate was from 150 to 172 per minute, the general condition bad, and evidencing a profound toxemia. Leucocytes rose rapidly to 17,000 at noon of the fifty-seventh day, when in view of the increasing severity of the abdominal signs and symptoms, operation was decided upon. Though the diagnosis was not positively made, it was considered by the surgeon who saw the case "that in the absence of signs of hemorrhage into the bowel, perforation had probably occurred, with extravasation of intestinal contents."

The patient's blood pressure had been carefully recorded. During the relapse it had ranged slightly below 120 mm. Hg., and during the period of abdominal symptoms it followed the same level, rising occasionally as high as 125 mm. Hg. as the result of free stimulation with strychnin and digitalin. In the absence of any fall in blood pressure, it was very improbable that any retained intestinal hemorrhage had caused the abdominal symptoms. The absence of any considerable or abrupt rise in blood pressure, on the other hand, was considered by the writer to be positive evidence that perforation had not occurred, and to justify the expression which I made of that opinion before operation. At 3.20 P.M. the abdomen was opened by an ample incision through the right rectus muscle, under cocaine anesthesia. The intestine was carefully examined, but no perforation could be found, and there was no peritonitis, aside from a light coating of filmy fibrin over the bases of two ulcers low down in the ileum.

The first case was remarkable in that the blood-pressure rise, characteristic of typhoid perforation, occurred so long before the onset of any other suggestive symptoms. At operation the con-

dition of the peritoneum was such as to cause the comment that its inflammation was apparently eight or ten hours old; which would correspond almost exactly with the first observed rise in blood pressure, and not at all with the sudden onset of abdominal pain. I am convinced that perforation in this case had already occurred when the first high blood pressure was noted. It is conceivable that the extravasation at that time was entirely among intestinal coils, and that subjective pain was not felt until the resultant inflammation had extended to the parietal peritoneum. The case suggested to Dr. Cushing the advisability of determining experimentally in animals whether a blood-pressure-raising peritoneal reflex can be elicited which is not associated with sensations of pain.

In the second case the evidence given by the blood pressure was entirely negative. The objection was made during the consideration of the case that the low blood pressure might be due to the profound toxemia; the vasomotor center (and periphery) being perhaps unable to respond typically to peritoneal afferent impulses. That the vasomotor irritability of the patient was not in abeyance was proven by the fact that shortly before operation she reacted to painful stimulation of the skin by characteristic transient elevations in blood pressure, while central stimulation with strychnin also produced a decided and more lasting increase in pulse tension. It seems certain, then:

(1) That patients with general or rapidly spreading peritonitis have constantly, at least in the early period, abnormally high blood pressures.

(2) That in perforative peritonitis a sharp rise in blood pressure *may* precede the onset of other symptoms.

(3) That in doubtful cases, like my second one, where perforative peritonitis is suspected, and the general previous blood-pressure level is known, the course of the blood pressure after the onset of grave symptoms should receive consideration in determining the propriety of operation.

It is to be hoped that the few observations so far recorded will be amplified by other workers in the coming autumn. In general hospitals, at least, it is easily possible to keep run of the blood pressure in all typhoid patients with bi-daily or more frequent determinations with the Riva-Rocci instrument. In this way it will be possible to have valuable data at hand in case of the development of intra-abdominal mischief, when the subsequent more frequent measurements of pulse tension will prove of greater value than if the patient's usual blood-pressure level were unknown. Rapidly rising blood pressures in cases with developing abdominal symptoms will probably prove more significant than any later stationary pressures, at whatever high level. It is the curve of changing direction in a well-plotted blood-pressure chart, rather than the position of that curve with reference to the base line of zero pressure, that should first challenge the attention of the clinician under these conditions.