

was found beyond worm cyst in the liver in a small percentage.

It will thus be seen that the experimental results we have obtained by the inoculation of the "micrococcus neoformans" into rats and mice have in every case been of the inflammatory character analogous to those we should expect to result from the inoculation of these animals with organisms of the same class. In no single instance have we met with tumours, either simple or malignant, in the animals we have inoculated. Most of the microscopical preparations obtained from Dr. Doyen's own animal experiments, and which we had the privilege of examining in his laboratory during our visits to his clinique at Paris, appeared to us to be of an inflammatory nature. Some of them, however, bore microscopically a superficial resemblance to carcinomatous and sarcomatous formations and these were localised and very small, and were unaccompanied by secondary deposits in the lymphatic nodes or generalisation in the organs; nor were they accompanied by wasting or the other clinical attributes of malignant disease. The animals were killed by him at fixed intervals of three, six, and nine months. A few of the microscopical preparations resembled in their structure simple growths, such as adenoma, lipoma, and chondroma. It is known that rats and mice, in common with the rest of the animal kingdom, are liable to tumour formations. That mice are subject to cancer, analogous to cancer in man, and that it may arise spontaneously is now an established fact.

In no single instance has Dr. Doyen to our knowledge produced cancer in mice or rats. The fact that malignant growths can arise spontaneously in these animals makes it highly probable that simple growths might have a similar origin. If such is the case those tumours which Dr. Doyen has met with in the large number of mice and rats he has inoculated may have existed prior to the inoculation. He himself, however, attributes their formation to the action of the "micrococcus neoformans," with which the animals were inoculated, in that he found the organism present in the growths at the time he killed the animals some months after inoculation. It is well known that micrococci can exist for long periods in the tissues of the body as parasites; and if an animal possessing a tumour were inoculated with such an organism we think it is highly probable that it would settle in the growth, for in man a large variety of bacteria are often found to be present in tumours and appear in cultures taken from such growths, whilst they are absent in the neighbouring healthy tissues.

The presence of organisms in tumours admits of two explanations—firstly, in tumours arising from the deeper layers of the epithelium in the skin and mucous membranes, where organisms are constantly present, it is quite conceivable that the bacteria grow *pari passu* with the tumour and accompany it throughout its life-history, being carried in the secondary deposits to the lymphatic glands and to the metastases. A polymorpho-coccus differing from the micrococcus neoformans only in its manner of growth on gelatin and potato is found in the skin, and Dr. Doyen himself has discovered the "micrococcus neoformans" in the secretion of a breast which was not the seat of a tumour. Secondly, in those tumours which do not arise in connexion with the skin and mucous membranes it is probable that the organisms reach them through the lymphatics—in this connexion the occurrence of a streptococcus in pure culture in two of our cases of lymphadenoma of the neck is interesting when we consider how prevalent this class of organism is in the mucous membrane of the throat. The streptococcus obtained from these two cases, inoculated beneath the skin of rabbits, was not followed by any neoplastic changes in the nearest lymphatic glands.

In conclusion, we would say that the organism which Dr. Doyen has named the "micrococcus neoformans" is, in common with other micrococci, often present in malignant tumours; but in our opinion it is not present in sufficient numbers, or with reasonable constancy, to be regarded as the etiological factor in the evolution of these growths. Moreover, in our hands the inoculation of animals with this organism is not followed by the formation of neoplasms but by the expression of an inflammatory reaction.

**HOSPITAL SUNDAY FUND AT BRISTOL.**—At a meeting of the committee of this fund held on March 29th it was stated that £2076 had been received this year against £2053 in 1905. The following grants were made: Royal Infirmary, £811; General Hospital, £680; Children's Hospital, £257; Eye Hospital, £121; and £120 were distributed among the dispensaries and smaller hospitals.

## A NOTE ON THE PATHOLOGY OF GANGRENE AND PERFORATION OF THE HOLLOW ABDOMINAL VISCERA AND "ACUTE PERFORATING ULCER OF THE STOMACH."

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CERTAIN of the hollow viscera—viz., the gall-bladder, the vermiform appendix, the cæcum, the urinary bladder, and the stomach—are subject to gangrene followed by perforation as the result of acute intra-visceral tension. In all, the condition is likely to be complicated by the intrusion of micro-organisms, but we suggest that mechanical causes are the chief factors in its causation. The striking similarity of the pathological appearances met with in all these viscera suggests a probable similarity in their origin. It seems to us extraordinary that this should have escaped notice, but, so far as we can find, little has been done to show how the behaviour of one of them under certain stimuli may be a guide to the conduct of the others in similar circumstances.

Our present paper only concerns patchy gangrene followed by perforation; this follows certain laws and is to be found affecting all the viscera that we have named. In all the forms of gangrene which we are considering the lesion commences as a small patch more or less circular in outline and at that portion of the wall of the viscus farthest from the source of its vascular supply.

*The gall-bladder.*—In the gall-bladder perforation generally occurs through a gangrenous patch at the fundus and is due to a stone impacted in and blocking its neck or the cystic duct, thus causing retention and consequent infection of the contents. Yet the perforation is not due purely to mechanical causes, for mechanical distension of the gall-bladder sufficient to produce rupture causes a leak near the neck of it, not near the fundus. The gangrenous patch at the fundus is roughly circular in shape and occurs at the position farthest removed from the origin of the cystic artery.

*The vermiform appendix.*—In the vermiform appendix, acutely inflamed and distended, gangrene first appears as a patch towards the tip and opposite its mesentery—that is, farthest from the origin of the branch of the ileocolic artery which supplies it. It is of some interest to note that in a single case of acute appendicitis, in which one of us (R. M.) excised the appendix only five hours after the commencement of the attack, there is shown a small patch in the position named of the lining mucous membrane which already exhibited signs of gangrene.

*The cæcum.*—More than once in opening the abdomen for intestinal obstruction due to stricture of the colon we have seen a gangrenous patch or patches circular in shape on the distended tense cæcum. These occur on its anterior surface in the neighbourhood of the anterior longitudinal band, that is, in the position farthest from the source of its vascular supply.

*The urinary bladder.*—For the urinary bladder the same rule appears to hold good. A man, aged 25 years, was admitted to the Royal Infirmary under the care of one of us (R. M.) suffering from retention of urine of four days' duration due to gonorrhœal prostatic abscess and excessive whisky drinking. His peritoneal cavity was distended with urine which had escaped through "a small round opening scarcely so large as a split pea, of grey ashy colour, at the superior portion of the posterior wall of the bladder"—i.e., the portion farthest from the main supplying vascular trunks.

*The stomach.*—Certain so-called ulcers of the stomach, we suggest, have a similar causation; the reasons on which this observation are based require some consideration. It is recognised by all authorities that there are two distinct types of "ulcer" of the stomach—(1) acute, and (2) chronic, and that the pathological causes of both are still undetermined. The chronic ulcer, with long history of previous

gastric trouble, usually situated about the lesser curvature, of irregular shape, and with hard edges, does not concern our present remarks. The so-called acute ulcer, which is comparatively rare, is of great interest in the present connexion. It is situated on a line drawn along the stomach from the centre of the cardiac to the centre of the pyloric orifice—i.e., farthest from the main vessels of supply. Unlike the chronic ulcer it is strikingly circular in shape. Its edges are not infiltrated or hard and examination of recently perforated specimens shows that the edges of the perforation are composed of gangrenous tissue. A frequent history noted by all observers is that serious stomach symptoms have not, as a rule, preceded the attack. Another point frequently observed, and which our view only, we think, explains, is that a second ulcer may be found on the posterior wall at a spot opposite that on the anterior.

We are indebted to Dr. J. Collingwood Stewart, late resident house physician at the Royal Infirmary, for an answer to certain questions which we considered might be usefully inquired into in the history of cases of gastric ulcer. The first was as to symptoms which might be caused by attacks of acute distension of the stomach. He ascertained that, with few exceptions, patients in whom a diagnosis of gastric ulcer had been made were subject to attacks of epigastric pain with a feeling of distension, accompanied by breathlessness, sufficient to necessitate loosening corsets or tight bands. In all cases where the diagnosis was verified by operation these symptoms were present.

We thought that excess of hydrochloric acid in the stomach might be accounted for by an extra consumption of sodium chloride and the second question referred to the liking for salt. Dr. Stewart's inquiry showed that out of 40 chlorotic girls more than one-half (25) took an unusual quantity of salt. Of 30 patients with symptoms of gastric ulcer three-fifths liked salt in excess. One "carried a piece constantly"; another "took a pinch whenever she got a chance."

Our view briefly is that excess of hydrochloric acid in the stomach, by producing pyloric spasm and acute gastric distension in an anæmic girl, gives rise to a small gangrenous patch or patches in the stomach wall, and that subsequent digestion of the dead or devitalised patch, if all the coats are involved, leads to perforation. It is generally recognised that the stomach juices in certain circumstances destroy its own wall. We may add that a sudden attack of distension due to pyloric spasm in the case of a chronic ulcer probably accounts for perforation in many instances.

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## THE RESULTS OF OPERATION FOR RADICAL CURE OF HERNIA.<sup>1</sup>

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THE aim of this paper is to test in the most stringent manner possible the results of an operation—that for radical cure of hernia—which now occupies a large proportion of the surgeon's time and energy. I find, for example, that over 500 out of a total of 4500 operations which I have performed in the London Hospital during the last 15 years have been done on herniæ. Thus it is probable that at least one-tenth of the general run of surgical operations in our hospital work is directed to obtaining the radical cure of hernia. The proportion of the different forms may be roughly estimated from my own record: inguinal hernia, 360; femoral hernia, 100; and umbilical, ventral, &c., herniæ, 50. These include about 150 cases of strangulated hernia. The answer to the question,—In what proportion is a permanent and complete cure obtained?—has been a varied one. As Mr. John Langton wrote in 1899<sup>2</sup>: "Afterwards ..... is after all the crucial test of our operative work; at present this 'afterwards' too often lies buried in the depths of the great unknown from causes over which we have but little control." Mr. Langton limited his consideration to cases of inguinal hernia in private practice and concluded, without giving exact statistics, that "in properly selected cases cures will result

temporarily, at any rate, in about 80 per cent., but it is probable that relapses are not infrequent."

I would urge that hospital patients afford a better test of the operation for radical cure than do private ones, granting that it is more difficult to follow up those belonging to the former class. It is in those who are engaged in hard manual labour—in stokers, soldiers, railway porters, and the like—that the result of our procedure is best estimated. Moreover, certain conditions must be thoroughly applied, especially with regard to the length of time that has elapsed since the operation. Bassini, to whom surgeons are indebted for having shown the importance of opening up the inguinal canal in the great majority of cases, reported cures in no less than 96 per cent. But his limit of time—nine months or over—was certainly too short and to some extent invalidates his statistics. I have taken as the shortest limit two years from the operation, but so many of my cases have been examined seven, eight, or even ten years afterwards that the average works out at about six years. This will probably be accepted as sufficient. If a man has engaged in his ordinary work for six years after the operation and shows not the smallest sign of recurrence the term "radical cure" may fairly be applied. Again, differing from some authorities, I reject the use of any truss after the operation, since the patient has submitted to it, as a rule, in order to dispense with the inconvenience of wearing one. In four or five of the cases included in my list the patient has of his own choice worn a truss at some time or other after the operation but not on account of recurrence. In all cases of umbilical hernia after operation an abdominal belt should be worn; in a few examples of inguinal hernia (especially the direct form) and of femoral hernia in elderly people a truss is ordered after the operation. But in the statistics that follow it will be understood that these conditions have been carefully observed: (1) that at least two years, and on an average from five to six years, have elapsed before the result is tested; (2) that no truss has been ordered to prevent recurrence and that within six weeks of the operation (often less) the patient has been directed to return to his work; (3) that the smallest tendency to bulge at the site of operation has been considered as a recurrence of the hernia; and (4) that any development of a hernia at another site has been recorded. The last point will be found to be of considerable importance, though it is curiously omitted by nearly all the writers on the subject.

*The result of operation for radical cure on inguinal hernia.*—Formerly it was considered inadvisable to operate on hernial subjects (apart from strangulation) who were over 40 years of age. But of late years this limit has been extended and in my list six patients were 50 years old or over. The best results of all are certainly to be obtained on young children, but it happens that only four of the cases in my list were under the age of five years at the time of operation. The great majority were men between 20 and 40 years of age. I have followed up 109 patients after operation on inguinal hernia with the limit of at least two years. In four of these the herniæ were double, making a total of 113. 13 were cases of strangulation (with five recurrences) and it seems fair to leave these out since several were patients of very advanced age, three being 55 years old, one 65 years, and one 74 years. Out of 100 cases primarily done for radical cure, eight of the herniæ have relapsed *in situ*; of these in five the recurrence was pronounced, one very slight, and two doubtful. Seven patients have since the operation developed an inguinal hernia on the opposite side and one a femoral hernia. I must admit that this result, 8 per cent. or less of true recurrence, is somewhat better than I had expected.

After all, the formation of a hernia elsewhere does not detract from the original operation being termed a radical cure. And if, judged from the most severe standpoint, the proportion of relapses is only from 6 to 10 per cent., the use of the words "radical cure" is thoroughly justified. The statistics of several surgeons relating to Bassini's method practically agree with my own. Thus Carlé and Nicoladoni found 6 per cent. of relapses *in situ*, and Ceccopieri and Scarrone 7 per cent. One may be allowed some suspicion of the much more favourable results that are now and then brought forward. Thus Lucas-Championnière claims to have had only 4 per cent. of recurrence but in one of his tables it will be noticed that only half the total number were followed up for more than two months! This fact, to my mind, renders valueless his statistics, since recurrence, if it does follow, usually occurs from nine to 18 months after the operation. There is, of course, no infallible limit and of the eight cases

<sup>1</sup> A paper read before the Medical Society of London on March 26th, 1906.

<sup>2</sup> Transactions of the Medical Society of London, 1899, p. 204.