

permeated lymphatics which formed the lines of communication."

The embolic theory of bone infection by the blood stream deemed the entry of the nutrient artery to be the sites of spontaneous fracture or growth.

If the humerus and femur are invaded from the lymphatic plexus of the deep fascia, as Mr. Handley believes, the first attack, he says, should be directed on that point at which the bone lies nearest to the deep fascial lymphatics, and therefore on that point at which the bone comes nearest to the cutaneous surface. Moreover, where the bone is provided with two or more subcutaneous areas, the seat of the first attack, according to the view of centrifugal spread, must be that area which is nearest to the trunk. On this hypothesis the point of invasion should be, and Mr. Handley says is, in the femur, the base of the great trochanter, and the adjoining part of the linea aspera. The point of invasion of the humerus should be, and actually is, relatively much lower down, at the deltoid insertion, since the whole of the upper half of the humerus is well clothed with muscles.

Mr. S. Paget asks, "Who has ever seen the bones of the hands or feet attacked by secondary cancer?" Mr. Handley's answer to this is that no patient lives long enough for centrifugal invasion to reach the distant parts.

Mr. Handley points out that the anatomy of the epigastric region strongly suggests the likelihood of the mode of invasion of the abdominal cavity. According to Stiles, the lower and inner margin of the breast lies over the sixth costal cartilage; that is to say, this part of the mammary circumference is only about an inch from the interspace between the ensiform cartilage and the seventh costal cartilage. Therefore, as soon as parietal permeation has extended little more than an inch beyond the edge of the breast the cancerous lymphatics of the deep fascia are no longer separated from the subserous fat (subperitoneal or subpleural) by a bony cage covered by thick muscles, but simply by a single layer of fibrous tissue traversed by lymphatics. At the tip of the ensiform cartilage the transversalis fascia is hardly recognizable as a distinct layer, and the parietal lymphatic plexus is separated from the subperitoneal fat simply by the linea alba. It is not surprising if through this obviously weak spot cancer frequently reaches the peritoneum before it has succeeded in reaching the pleura, even at points directly subjacent to the primary focus.

Before any operation for the removal of cancer of the breast is undertaken, Mr. Handley advises that a careful examination of the epigastric region should be made to see if there is any tenderness or pain there. The presence of tenderness or pain should raise the suspicion that epigastric invasion had already occurred, and in such cases the liver should be carefully palpated when the patient is under the anaesthetic before the breast is removed, and he goes on to say that it must never be forgotten that the first sign of epigastric invasion may be found not in the epigastric region, but in the pelvis from the gravitation of cancerous particles into it; a vaginal and rectal examination should, he thinks, be made prior to operation.

In operating for removal of breast cancer Mr. Handley strongly advises that the site of the growth be made the centre of a circle from which the deep fascia is to be removed. The skin flaps should be raised till a circle 10 to 12 in. in diameter with the primary growth for its centre is exposed. The exact anatomical limits of this dissection will, of course, vary with the situation of the growth in the breast. An annular incision, marking out the 10-in. circle of deep fascia to be removed, is carried down to the muscles through the deeper subcutaneous fat close to the base of the skin flaps.

In the lower part exposed by this wide raising of the skin flaps the anterior layer of the rectus sheath on both sides of the middle line should be raised up and removed with the deep fascia, for it is specially in this region that infection of the peritoneal cavity may occur. After dividing the pectoral muscles, exposing the costo-coracoid membrane, and clearing the apex of the axilla, the whole mass is turned outwards, and where the digitations of serratus magnus lie in contact with the deep surface of the breast they should be removed together with a superficial layer of the digitations of external oblique.

The theory of infection, even of distal parts, by way of the lymphatics, commends itself strongly, but the question still is whether this is the only source of infection. Sir George Beatson of Glasgow, who has done much and good work on breast cancer, pays a tribute to Sampson Handley for the work he has done in outlining the limits of the lymphatic system and its distribution, but does not agree with him in his permeation theory, and feels there is more than that needed to explain all that is found, and takes the view that pressure dissemination represents more clearly what takes place.

Mr. G. L. Cheatle, in several interesting papers, draws attention to the fact that there seems to be a certain relation between nerve supply and the growth of cancer, and that there seems a greater tendency for the disease to spread along the area of the particular nerve distribution in which it first occurred rather than independently into neighbouring areas. Mr. Cheatle also states that he has been able to demonstrate that inflammatory changes occurred in two *post-mortem* cases in the spinal ganglion, on the cutaneous distribution of which the cancer had begun, whilst the ganglia into whose cutaneous distribution the cancer had spread showed the changes of degeneration which had been noted both by Lugaro and himself, and points out that in the two cases described the cancer began on parts of the skin where nerves become cutaneous. If the lesions in the ganglia were secondary to the lesions of the skin, then Mr. Cheatle thinks that there would also have been secondary inflammatory changes in all the ganglia whose peripheral branches were involved in the lesion, but he found that this was not the case, although these particular branches had been involved for many years. Mr. Cheatle puts three pertinent questions which certainly ought to be borne in mind in investigating cancer, namely:

1. Is the inflammatory change within the posterior spinal root ganglia in any way connected with origin or spread of cancer?

2. If it is, did it exist before the cancer began? and hence had it anything to do with the genesis or point of incidence?

3. If it occurred secondarily to the cancer, had its presence anything to do with the spread of that disease?

The theory of the spread of breast cancer brought forward by Mr. Handley offers a much more hopeful prognosis in early cases than has hitherto been possible, but still Sir Watson Cheyne's advice given some years back, namely, that in the first operation lies the patient's only chance, and that it must therefore be done with the greatest thoroughness, however limited the disease may be at the time of operation, is as true now as ever it was.

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FOREIGN BODY IN THE ABDOMINAL CAVITY.

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The following case appears to me to be of more than ordinary interest:

A married woman, multipara, aged 33, came to me on September 5th, 1912, in great trouble. She told me that on September 2nd, as her period had not come on at the usual time she had endeavoured to bring it on by introducing the end of a bone crochet hook into the uterus, a plan which she had found successful on a previous occasion. The hook slipped from her fingers and disappeared, and she had been unable to find it since, although she had sought for it with a "marrow spoon." There had been some slight haemorrhage, but not so much as with an ordinary period.

When I saw her she complained of some pain in the lower part of the abdomen, which had been increased by the jolting of the spring cart in which she had come four miles to see me. The pulse was 64; temperature 98.4°; bowels open.

On vaginal examination the os was just open enough to admit the tip of the finger, which on withdrawal was slightly blood stained. There was no marked tenderness, nor any sign of the crochet hook.

I sent her home to bed, and next day, after a consultation with Dr. Campbell of Ross, I dilated the os with Hegar's dilators under a general anaesthetic, and explored the uterus, which was empty. Abdominal palpation had revealed only slight tenderness above the pubes, and the patient complained of no uneasiness so long as she kept quiet.

For the next three days nothing occurred, but she still complained of slight tenderness as before. There was no rise in the temperature or pulse-rate.

On the third day she told me she thought she could feel the hook, and pointed to a place midway between the umbilicus and the pubes in the middle line. The abdominal walls were very thin and lax, and I could distinctly feel the end of something hard apparently sticking up inside the abdominal cavity.

On September 12th, in the Ross Cottage Hospital, I opened the abdomen by an incision in the middle line, and could then distinctly feel a foreign body lying between the layers of the mesentery just where they separate to surround the gut, and on carefully removing this it proved to be the missing crochet hook, an ordinary bone one $4\frac{1}{2}$ in. in length. A stitch was put into the small opening in the mesentery to control some slight haemorrhage, and the abdominal wound was then closed in the usual way. The patient made an uninterrupted recovery, and left the hospital three weeks later with the wound completely healed.

Whether the hook was introduced through the uterine wall and afterwards found its way between the layers of the mesentery, or whether it was passed through the posterior fornix behind the peritoneum and was never in the peritoneal cavity, there was no evidence to show; but it is remarkable that no septic trouble was caused by the passage of an unsterilized instrument into the abdominal cavity and its sojourn there for eleven days.

Memoranda :

MEDICAL, SURGICAL, OBSTETRICAL.

ADRENALIN IN WHOOPING-COUGH.

WHILST not claiming to be able to check the paroxysms of whooping-cough in ten days by adrenalin, I think that my results have been sufficiently gratifying to merit their publication.

It was after successfully treating some cases of asthma by the hypodermic injections of 1 in 1,000 adrenalin solution that I decided to give it a trial in whooping-cough. I did not think it wise to attempt hypodermic medication with children, and so gave it by the mouth. The dose given varied from 1 to 3 minims in water, according to the age of the patient. At first, with infants under 6 months, I gave $\frac{1}{2}$ -minim doses, but found that that dose was too small. The largest dose given was 3 minims, to a patient aged 7 years. The frequency of administration varied according to the severity and frequency of the paroxysms—every three hours in the more severe cases and every four in the less acute.

My first case was that of a boy aged 7 years. Treatment was commenced when the paroxysmal stage had existed for two days. He was then having attacks of coughing every half-hour during the day, and every twenty minutes during the night. He was given 3 minims every three hours. The paroxysms quickly diminished in frequency and intensity, and ceased completely fourteen days after the treatment was commenced. There was no relapse.

I communicated the results of about 40 cases to the Liverpool Medical Institution in May last. Unfortunately all the cases did not give such a good result as the one mentioned above, but there was a decided benefit in practically every one.

The average duration of a case of whooping-cough is given as six weeks. Under adrenalin treatment it is the exception for one to last longer than three weeks.

In many cases of whooping-cough, particularly when it occurs in infants and young children, there is persistent vomiting, which produces marked anaemia and wasting. As far as my experience goes, adrenalin checks this very quickly, with the result that there is, in many cases, a marked improvement in the patient's general condition before the cough has ceased. This, I think, considerably lessens the liability to most of the complications and sequelae of the disease.

No other form of treatment was administered along with the adrenalin, and the patients were allowed out whenever the weather permitted.

I cannot explain the action of the remedy, the administration on my part being quite experimental. The number of cases so treated is certainly not large, and perhaps the results from a more extended trial would not be so successful, but I certainly think that adrenalin is worthy of such an extended trial in the treatment of whooping-cough.

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LOCAL APPLICATION OF SALVARSAN IN ULCER.

THE cases of yaws at the St. Augustin Yaws Hospital having been reduced from 250 to 29 by the use of salvarsan, I looked about for other fields to try this remedy in. I find that many ordinary ulcers heal quickly after a single dusting with neo-salvarsan or salvarsan diluted with xeroform in the proportion of 1 to 3. The after treatment is a daily dusting with xeroform* lightly sprinkled on. I do not allow water or lotion to touch the sore. I tried salvarsan mixed with bismuth subnitrate in three cases, and found it satisfactory. The ulcer is protected by a piece of lint, loosely applied, to keep out dust and flies, and latterly I have painted the skin round the ulcer twice with tincture of iodine. The patient is kept in bed for one day. Salvarsan is expensive. In the majority of the cases I used neo-salvarsan. So far my results in ordinary ulcers, all under six months' duration, have been: Rapid healing, 36 per cent.; very satisfactory healing, 60 per cent.; failures, 4 per cent.

I have tried this treatment on two cases of soft chancres; as it is rather painful, I am experimenting with local anaesthetics added to the powder. The results were good in both cases. It is my intention to try it in cases of ulcerating granuloma of the pudenda, for although salvarsan fails to cure these cases when intravenously injected, it is worth while to try the effect of local treatment. Through the kindness of Dr. F. de Verteuil, of the House of Refuge, Port of Spain, this treatment is now being applied to chronic ulcers with satisfactory results at the start. Modifications of the treatment will, no doubt, be required by further experience. Chronic ulcers may require a stronger powder. Meanwhile I put on record the fact that ordinary ulcers are greatly benefited by a single local application of neo-salvarsan or salvarsan.

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INGUINAL HERNIA: RUPTURE OF INTESTINE: LAPAROTOMY: RECOVERY.

H. H., aged 50, garden labourer was seen for the first time about 6 p.m. on June 28th, 1912. He stated that he had been perfectly well that day till about 4 p.m., when he was "larking" with some other men, one of whom accidentally gave him a light blow in the right groin. He almost at once felt a sharp pain in the upper part of the abdomen; he tried to micturate but could not do so. In about 20 minutes he vomited, the pain in the epigastric region becoming worse. He was brought home and put to bed. There was a definite history during the last 15 years of dyspepsia, with pain and flatulence after food. There had not been any haematemesis.

The patient was lying in bed in a collapsed condition, with drawn, anxious-looking face. The temperature was 97°, the pulse 88, and small. He had vomited three or four times since 4 p.m. The abdomen was hard and tender, but moved slightly on respiration; there were no dull areas. The pain was all referred to the epigastric region. He stated that 14 days previously, after lifting a heavy weight, a swelling appeared in the right groin, which disappeared each night. On examination no hernia was seen. I decided to perform an immediate laparotomy.

Operation.—The abdomen was painted with tincture of iodine prepared with 70 per cent. alcohol. He was anaesthetized with open ether, and chloroform and ether. The abdomen was opened through the right rectus, above the umbilicus. A little turbid serum but no gas escaped. The stomach and duodenum were carefully examined for a perforation, but nothing abnormal was found. The appendix was also healthy; whilst examining the latter a small piece of

* Tribromophenol bismuth.