

*Post mortem* on April 3rd.—The laparotomy wound was well closed and quite clean, also the incision in the diaphragm, which was quite airtight. There was no pneumothorax, and the chest looked healthy, except some septic metastatic foci at the base of both lungs. The pericardium and heart looked healthy. Both kidneys showed small calculi and pyelo-nephrosis. The left ureter was partly blocked by the pus and gravel at the bladder orifice.

*Remarks by Major Neve.*—The striking success of Capt. Bost's procedure in this case as regards the resuscitation of the heart's action after 25 minutes' absolute cessation proves the value of efficient heart massage. Without that the man was already dead. It was clear to all the five surgeons who were present, that we were dealing with a case of primary heart failure under chloroform narcosis, due to the toxæmia of the patient's disease.

We could carry on the respiration without his muscles, but not the circulation. Sub-diaphragmatic massage was inefficient, because it did not stimulate the cardiac nerve ganglia at the base; but after incising the diaphragm and grasping the base of the heart, ten or twelve gentle squeezes started regular contractions, and the strong apex beat became visible to all onlookers. We have discussed the technique elsewhere. The incision was one which Capt. Bost had previously planned on a cadaver.

It is unfortunate that this method was not adopted a few minutes earlier.

#### CONCLUSIONS.

1. We consider that this case illustrates the unique value of heart massage, and that the human heart can be resuscitated after a variable length of time, in this instance after 25 minutes.

Nothing else could have re-started the cardiac action in this case.

2. *Type of cases for massage.*—All cases of suspended heart action following an anæsthetic, regardless of theoretical, etiological factors after a certain interval. Cases of asphyxia should also fall within this group.

3. *Length of interval.*—This should probably vary with individual cases, but should rarely be done under 5 minutes (unless the abdomen be already open) and certainly after 8 minutes, though a longer interval need not bar the operation.

The simpler methods of resuscitation, such as artificial respiration, tongue traction, sharp percussion over the cardiac region, and inversion of the patient, should begin in the first minute, but not be uselessly persevered in to the neglect of more efficient measures.

4. Sub-diaphragmatic massage may suffice, especially in children, and if very promptly undertaken. But if only the apex is reached and the

heart remains unresponsive, the diaphragm should be incised and the base of the heart be massaged without further delay.

5. That no surgeon, even if relatively unskilled, should be content to abandon a case without giving his patient the benefit of direct cardiac massage.

6. We claim that this new technique offers a simpler method of approach and is a decided improvement upon all other ways of doing direct heart massage, as it involves less risk of hæmorrhage, trauma and shock, and can subsequently be more quickly and satisfactorily closed.

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#### CARDIAC MASSAGE IN CHLOROFORM POISONING.

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As these cases are not very common, a short account of the following may be of some interest. The patient, Private Rarshid Saleh, aged 24, was admitted into No. 34 General Hospital on the 4th May, 1918, convalescent from dysentery.

He was feeble and emaciated and had slight attacks of diarrhoea off and on. His pulse and temperature were practically normal. On the 26th May, 1918, the patient developed signs of early ascites.

On the 13th June, 1918, the abdomen was sufficiently tense to cause considerable respiratory difficulty. At this time we had in the hospital a series of cases of ascites of obscure origin, and as the ascites had rapidly recurred after tapping or simple laparotomy in some of the other cases, I decided to perform lymphangioplasty on this case.

At 10 A.M. on the 13th June, 1918, the patient was anæsthetised with chloroform.

After I had applied the sterilised towels to the abdomen, the anæsthetist informed me that the patient had stopped breathing. It was evident, from the colour of the mucous membranes and the absence of a pulse at the wrist, that the heart had stopped. This was confirmed by means of the stethoscope. Artificial respiration was tried for two to three minutes with no result.

As the operation proposed, namely lymphangioplasty, involved a laparotomy in any case, I decided at this stage to open the abdomen and try the effect of cardiac massage, while Captain

de Mowbray and the anæsthetist persevered with the artificial respiration.

A 3-inch median incision was made above the umbilicus. Then, with the left hand over the cardiac area externally, and the right on the under-surface of the cardiac portion of the diaphragm, I submitted the heart to a series of rapid squeezes between the two hands at the rate of about 50 to 60 a minute. After the 10th compression the heart started beating. It went on for 30 beats at the rate of 90 to 100 a minute and then stopped.

The squeezing was repeated, and after the 4th compression the heart again started beating—at first very irregularly, and stopping at intervals for 2 to 3 seconds. After about 10 minutes of this irregularity, the heart beats and pulse started alternating, and the alternation continued until the onset of the final collapse preceding the patient's death sixteen hours later.

Curiously enough, natural respiration only commenced with the onset of the alternation. As soon as the patient seemed to be out of danger, four lymphangioplastic silk threads were rapidly inserted and the abdomen closed without any further anæsthetic being required.

The patient took about two hours to regain consciousness. At 4 P.M., *i.e.*, six hours after the operation, the patient had completely come round from the anæsthetic and said he felt fairly well, except for the pain at the site of the incision. His pulse-rate was then 98. He was also able to take sips of milk and water.

Soon after midnight he developed rapid collapse and his pulse-rate went up to 150 or more. The ordinary methods of treating collapse were tried with little or no results, and the patient died at 2 A.M.

It is interesting to know that another of these cases of ascites died fairly suddenly about 12 hours after a simple laparotomy.

Two more who had not been surgically treated also died somewhat suddenly, so that it is possible that the anæsthetic may not have been the main cause of this patient's death.

During the above procedures, I was impressed by two other facts of considerable interest:—

1st.—That the heart could not be felt through the diaphragm when it was not beating; but as soon as it commenced to beat, the cardiac impulse was much more distinctly felt than the apex beat on the chest wall.

2nd.—That the colour of the mucous membrane of the lips was restored after 3 to 4 beats of the heart, whereas the colour of the peritoneum only returned after a dozen beats.

In conclusion, I wish to thank Lieut.-Colonel F. H. Maturin, R.A.M.C., for permission to publish this case.

## SOME POINTS IN CONNECTION WITH WAR INJURIES OF PERIPHERAL NERVES.

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THE difficulties in the diagnosis and treatment of peripheral nerve injuries in the early stages of gunshot wounds are considerable, and they do not seem to the general practitioner to have been made much clearer by many of the descriptions that have been published from time to time during the war.

It is very difficult, if not impossible, to find out if a nerve has been cut through, bruised or merely pressed upon by damaged tissues or exudation in the neighbourhood.

The consensus of opinion among neurologists in Europe seems to have arrived at the conclusion that early operation is inadvisable and that more harm than good results from interfering with a nerve that may be in process of regeneration, new axis cylinders being particularly susceptible to damage. On the other hand, if a nerve has been cut through (and there is no way of knowing this except by looking), the ends may be so placed that the nerve can regenerate; but they may not. In the latter case the ends must be united by operation later, but regeneration usually takes double the time by secondary suture that it does by primary. The temptation is, of course, strong to operate on every case that appears to be a complete lesion but the war experience in Europe has been that such cases may recover as well without operation as with, and no surgeon really feels a better man for having done an unnecessary operation.

The difficulties are further increased in the case of sepoy. It is of very little use to look for paralysis or sensory loss at the time of admission (we get our casualties here within about 7 hours of wounding). A limb at this time is generally swollen and tender all over, perhaps there is a fracture and the man may be sleepy from the effects of morphia. As regards sensory loss too, a sepoy usually considers he has a right to have anæsthesia over the entire limb that is injured and he will endure any amount of pin-pricking to establish this. It is not possible to get him to understand why we think it important to map out areas of anæsthesia. He only realises that he is an injured individual ..... and may perhaps get sent to India.

The next point is, having found that there is a nerve lesion, what is the proper thing to do? As mentioned above, European surgeons who have had special experience in this class of case, leave nerve lesions alone from the operative point of view till the third to the fifth month. It would be interesting to know what has been the experience in the Indian war hospitals. Have there been better results in cases operated on