ON LIFE-SAVING FROM DROWNING BY SELF-INFLATION.

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"He long survives who lives an hour
In ocean, self upheld;
And so long he, with unspent power,
His destiny repelled;
And ever as the minutes flew,
Entreated help, or cried 'Adieu!'" COWPER.

THE reduction of the specific gravity of animal bodies by means of hypodermic inflation is a subject which has for some time engaged my attention. I have endeavoured to elucidate it by an experimental inquiry, my object being to diminish the great mortality from drowning. From the earliest ages attempts have been made to render the human body capable of floating in water, but these efforts have mainly been in the direction of attaching to the body, when immersed, various substances of less specific gravity—such, for instance, as the inflated skins of animals, life belts, &c. Atmospheric air, from its extreme lightness, —namely, 815 times lighter than water—has been most frequently employed, but there has been some difficulty in finding a suitable envelope for containing it. It is atmospheric air which is universally employed by nature to produce buoyancy. Many fishes possess hollow sacs filled with air, and these sacs are developed occasionally from the ventral, though more commonly from the dorsal wall of the pharynx, œsophagus, or stomach. In the Teleostei the membrane lining the branchial chamber is prolonged into sacs, which lie at the sides of the body. The Diodons and Tetrodons render themselves buoyant by swallowing air, which filling the first stomach, they become inflated like a balloon. In the case of birds there are in some as many as nine air sacs, two of which are situated in the cervical region, whilst in some of the Lacertilia the membrane of the larynx between the circular cartilage and the first ring of the trachea protrudes in the form of an air sac.

It will be within the recollection of your readers¹ that I have already demonstrated at the International Fisheries Exhibition the possibility of inflating the subcutaneous space in animals so as to render them sufficiently buoyant to be employed either singly or yoked together to convey persons from a wreck to the coast; but since animals are not always present in cases of shipwreck, and human lives may be saved by being enabled to traverse a few yards of deep water, I have demonstrated the possibility of producing in man himself the condition known as surgical emphysema. In August, 1883, at King's College Hospital, by means of a blowpipe and elastic syringe, I inflated at the wrist the subcutaneous tissue of the whole body with the result that in a few minutes sufficient air passed under the skin to support a weight in water of between forty and fifty pounds. This amount is considerably more than would be required to preserve a person from drowning, nine or ten pounds being considered sufficient. Although one can imagine the existence of circumstances which would justify such a proceeding as the above, yet the practice of it would require a certain amount of surgical knowledge. Moreover, it would be impracticable except under favourable circumstances; and there are probably few persons capable of accomplishing it in their own bodies. I have accordingly sought for a much easier and more ready means of rendering the body buoyant in water, and which could be accomplished without the employment of any apparatus, and, in fact, which might be performed without assistance in a moment, under the most adverse circumstances, and by the most ignorant, if once instructed in it, and without danger or pain, and suitable alike for the roughest sailor or the most delicate female. The intention of the proposed operation is to cause the skin of the neck and upper part of the chest to be sufficiently distended with air to support the weight of the body when immersed. The inflation being effected by the person himself by means of his lungs without the intervention of appliances. The operation consists in making a small puncture—not larger than would allow, for instance, of the passage of an ordinary blowpipe—in the mucous

membrane of the inside of the mouth, the object being to open a communication for the passage of air from the cavity of the mouth into the subcutaneous spaces of the neck. The situation chosen for the puncture is in the angle formed between the gum of the lower jaw and the side of the under lip or cheek, about opposite the first molar tooth of the lower jaw. The point of the instrument perforating should be passed down a short distance between the skin of the side of the face and the superficial fascia of the neck, its point being guided by the finger placed on the outside of the face and neck, taking care not to puncture either the skin or the superficial fascia. This having been done, and the instrument removed, in order to inflate the skin of the neck and chest, the patient should close the mouth and nose, and make a succession of forcible expiratory efforts, when the air contained in the cavity of the mouth will pass freely into the subcutaneous tissue of the neck. These expiratory efforts, inspiration being effected through the nostrils, should be continued until the skin is fully distended with air, which will pass readily to both sides of the neck and down the chest as far as the nipples; and this is all that is required to render the body buoyant in water. Should it so happen that the superficial fascia has been punctured and the air pass beneath it, the only difference in effect would be that the extent of air would be limited by the attachments of that membrane to the clavicle below and the border of the jaw above. The amount of air which the skin of the average neck is capable of holding without undue distension has been measured, and found to be enough to support ten pounds, and this is amply sufficient to support the body immersed in water. The time required for inflation is found to be less than three minutes. The neck may be kept in an inflated condition by closing the puncture by pressure on the outside of the cheek by the finger, or by keeping the mouth distended with air; and when required the air may be immediately discharged from the neck by allowing the puncture to remain open, or by suction.

The advantages may be summed up as follow:—1. The proceeding is perfectly harmless and almost painless, quickly done, and almost immediately recovered from. 2. It may be learnt in a few minutes, no technical knowledge being required, and may be accomplished by the person himself without assistance. 3. No special apparatus is required. In an emergency the point of a penknife, or even a sharp pointed splinter of wood, is all that would be required. The inflating apparatus is the person's own lungs. 4. The air could be repeatedly reinflated, and even during prolonged immersion.

Clapham-common, S.W.

TRANSFUSION IN A CASE OF CHRONIC PHTHISIS.

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ON May 14th of last year, in consultation with Mr. De Gruyther of Holloway, I saw Mr. C—, a diamond cutter, aged thirty-four. He had been suffering from phthisis for about nine years, but had been able on and off to go to work. Latterly he had found his strength failing and nine or ten weeks before I saw him he had given up work. For seven weeks he had not been outside the house, and for the last fortnight he had kept his bed continuously. He was then so weak that he was unable to get out of bed or to stand without assistance; the most he could do was to sit up in bed and get to the edge of it and let his legs hang down. He was very thin, the hands shrunken and the skin loose; the face was pale with a patch of pink colour on each cheek; the skin of the face looked sodden and clammy, though he said that he was never troubled with sweating, except after a bad fit of coughing. The expression was anxious; the fingers were clubbed; pulse 135, full and soft, but easily stopped; temperature 100°; breathing rapid with a rattling bubbling sound, audible across the room. By the bedside was a jampot half full of tenacious, purulent sputum, streaked with thin lines of bright blood. He said he had on several occasions brought up large quantities of blood. After examining the chest we agreed that there was a large cavity in the right apex, extensive consolidation, and possibly, also, a cavity in the left. The

¹ Vide THE LANCET, July 7th, 1883, "Hypodermic Inflation."

heart was normal; no albumen in the urine, of which he passed about a pint and a half a day; but feet and ankles were slightly swollen. The bowels acted daily, motions formed, no blood. Tongue furred; mouth not aphthous. The abdomen was slightly prominent, but soft, not tender, and was resonant down the left side. He did not complain of pain or discomfort after food, or any other signs of dyspepsia. Mucous membranes of eyelids and lips were pale. The patient said he took his food well and enjoyed his meals. His habits appeared to be to have a cup of tea and a piece of toast about 6 A.M., a couple of fried eggs or some fish at 11, and to dine at 6 P.M. off a chop or steak. He did not like milk and did not take much of it. Sometimes he would take a glass or two of port. The friends thought there was very little hope for the patient, and, to use their own expression, wanted to know if we could "patch him up for a few weeks." Considering that the patient was so anæmic, but still had a considerable amount of vitality in him that he could take his food so well and was not being exhausted by night sweats, I suggested transfusion. The patient was willing to try anything, and his wife offered to give the blood.

The next day (May 15th), having procured an Aveling, with the assistance of Mr. De Gruyther and a sister of the patient I transfused about two ounces directly from a vein in the wife's arm to a vein in the patient's arm. During the process the patient exclaimed, "I feel so hot; open the door." The wife rather complicated matters by vomiting during the transfusion, and was rather faint afterwards; but the patient was in no way worse, and said he should be ready for his dinner at the usual time. On the 16th Mr. De Gruyther reported: "Patient is better to-day; his pulse seems to me to be improved, and is 120; he himself feels better." On the 19th I saw the patient, and found his pulse 128, but much less easily stopped than on the 14th. He had taken his food as usual, and said he felt stronger. He further said that on the 17th he had got out of bed and had walked across the room to an arm-chair without assistance, a thing he had not been able to do for a fortnight. The wounds in both cases looked well, and there were no signs of inflammation or tenderness over the course of the veins. On the 21st Mr. De Gruyther again reported: "Our patient is progressing very favourably; his pulse was about 120 to-day and firm; he walks without aid." On the 22nd, one week after transfusion, I saw the patient. I found him sitting in an arm-chair, having moved into the next room. He had walked from one room to the other without assistance. He looked much happier; the pulse was stronger and 128. He said he felt stronger, and that he was sure he should be better if he could only get some sleep, that he had hardly had any sleep from 9 P.M. till 5 A.M. the previous night on account of his cough. The patient's wound was almost well, the one in the wife's arm showed a small slough. On the 25th Mr. De Gruyther wrote: "Our patient had a weak pulse of 116 yesterday, and he himself felt weaker. He says he had a better night on Friday (May 23rd) after inhaling five minims of eucalyptus oil in a metal respirator. The slough from the wife's arm has not come away." On the 26th Mr. De Gruyther wrote: "Our patient is not so well to-day."

May 28th.—Thirteen days after transfusion I saw the patient. I found him sitting on a couch in a room next his bedroom; he had walked there with difficulty, and with assistance. His expression was much more anxious; his pulse was 130, and very easily stopped; his appetite was very bad, and he could only take liquid nourishment, such as egg and milk or beef-tea. He had lately discovered that he could take milk. His ankles were swollen. I found that on Friday, the 23rd, he had walked by himself with ease down the passage of his house out into a small garden or yard at the back and had sat in the sun for some hours, and had thoroughly enjoyed it, and that he had slept better that night. On Saturday, the 24th, he had done the same thing again, but had walked with even greater ease, and had felt still stronger. Sunday, the 25th, was a cold day, and he did not go out. On Monday, the 26th, he had not felt so well; on Tuesday, the 27th, he had felt worse, and on Wednesday, the 28th, he had gone back considerably. The cough was still the great trouble, it prevented his resting; but the amount of sputum was considerably less than when first seen, and there had been no sign of blood in it since the transfusion. The wife complained of pain in her arm, the slough had come away, the wound was healthy and healing,

but there was tenderness along the course of the median vein, and the vein was thickened and cordlike. On May 30th Mr. De Gruyther wrote: "Yesterday our patient was a good deal weaker; he took a fair amount of nourishment, and had better rest at night."

June 3rd.—I saw the patient, and found him on the couch; pulse stronger, 120. He would take no medicine of any kind; he looked happier again; his appetite was better, and he fully intended to go out into the garden again as soon as practicable.

June 12th.—The patient had been out in the garden several times since June 3rd, but he had gone back. Pulse 120, weak and small. Both legs were much swollen and cedematous. The abdomen measured thirty-one inches and a half; it was tense and full of fluid. Very little albumen in urine, but some dyspnoea at times. A day or two after this date the patient was taken in a cab to the German Hospital, where he remained until July 27th, when he died. I have not been able to hear whether there was a post-mortem or not, but I think it is most probable that it was not allowed.

Westbourne-street, W.

A Mirror

OF

HOSPITAL PRACTICE, BRITISH AND FOREIGN.

Nulla autem est alia pro certo noscendi via, nisi quamplurimas at morborum et dissectionum historias, tum aliorum tum proprias collectas habere, et inter se comparare.—MORGAGNI *De Sed. et Caus. Morb.* lib. iv. Proœmium.

ST. GEORGE'S HOSPITAL.

A CASE OF RUPTURE OF THE GLUTEAL ARTERY AND ONE OF AMPUTATION AT THE HIP-JOINT ILLUSTRATING MORE RECENT METHODS OF ARTERIAL COMPRESSION.

(Under the care of Mr. HAWARD.)

FOR the following notes we are indebted to Mr. R. Mar-gerison, surgical registrar.

John D—, aged twenty-four, received in May last a blow on the right buttock from the buffer of a locomotive. When admitted soon afterwards into St. George's Hospital, the buttock presented near its most prominent part a contused and lacerated wound large enough to admit a finger. Out of the wound dark blood oozed very freely. The soft parts were very extensively undermined, and beneath them was a large and increasing collection of blood. This blood collection did not pulsate and no bruit was audible. A pad was firmly bandaged over the buttock for three hours. In this interval the collection of blood had greatly increased, and when the pad was removed large quantities escaped. Ether was then administered and the right iliac artery compressed with Davy's lever. When once introduced far enough, this instrument acted perfectly. Mr. Haward enlarged the wound to a length of some six inches. The gluteal muscles were found to be torn across, and beneath them existed a large cavity full of blood. This was quickly turned out, bringing into view the sciatic notch and the open mouth of the gluteal artery. This and a great many other muscular vessels were secured with catgut ligatures. No blood was lost during the operation and the man's recovery was uninterrupted.

The case shows well the value of the lever, and in connexion with this subject of compression of the large vessels of the abdomen it seems well to mention a case of amputation at the hip-joint for sarcomatous disease, which also occurred in Mr. Haward's practice. Here the abdominal aorta was very effectually controlled by a contrivance more or less like that suggested by Sir Joseph Lister. The blunted apex of a pyramidal piece of wood was fixed over the abdominal aorta by an elastic bandage. The apex of the pyramid was about one inch square and covered with felt. The base measured about three inches square and presented instead of a plane surface a broad and shallow groove. The elastic bandage passed round the pelvis and along this groove. When fixed it was placed in the charge of an assistant, who, grasping the wood with both hands, could very easily and