intestinal obstruction, when faecal vomiting was urgent or was imminent, were those in which this method should be especially valuable. The experience of surgeons, both here and abroad, has demonstrated that subarachnoid injection is far more dangerous than was anticipated; and many surgeons of special experience with spinal analgesia have advised restricting the method to normal patients—that is, to those who run no particular risk if a general anaesthetic is efficiently administered. Some surgeons, however, have clung to the hope that for the particular cases under consideration the spinal method, with its admitted dangers, presented less danger than a general anaesthetic. They extol the facility it offers to the operator by relaxing the abdominal musculature, and so making his work easier and more rapid. The case of death under spinal analgesia¹ recorded by Mr. F. Victor Milward has unhappily shaken our confidence in the method so far as safety is concerned. As is pointed out, the case was parallel in all ways with similar cases treated on similar lines, and yet the result was fatal. It would be quite unjustifiable to discredit any method because it fails in some instances; but such failure, provided it can be shown to have been due to no lack of skill or knowledge, must give pause, and compels us to regard the method as dangerous in certain cases. The unfortunate fact about the published cases of deaths under spinal analgesia is that they do not appear to obey any rule and so allow of correction. Further, as in Mr. Milward's case, the death is not always, or even commonly, due to the disease or operation which is being performed, but is the result of a new factor introduced into the problem—a factor which, used to promote safety, resulted in death. The method is, however, only at present in the stage of inquiry; it would be premature to assert either that it is useless, or to extol its merits in the cases we are considering; we can only say that at present the method does not always succeed, and is not free from danger.

The general anaesthetic in the cases under review can certainly be guarded against overdosage, but may, and often does, lead to a fatal issue through abolishing reflexes whose function is to prevent vomited matters entering the air passages.

The problem is, then, to discover whether it is possible to employ general anaesthetics and yet obviate the danger in question. The mechanism of lung flooding is probably explicable as follows: Vomiting as a purely reflex act does not occur under complete anaesthesia, and entrance of vomited matter into the airways is prevented so long as the laryngeal reflex is present. When the patient is put under a general anaesthetic the muscular tonus of both voluntary and involuntary muscular tissue is lowered, and the pressure *a fronte* allows the intestinal contents to enter the stomach. When distension of this viscus becomes sufficient its contents are ejected through the cardiac orifice and enter the pharynx. The process is a regurgitation rather than vomiting. As the laryngeal reflex is also less able to prevent fluids entering the trachea—if, indeed, it is not wholly abolished—the lungs become flooded. It often happens that the regurgitation of a stream of stercoraceous fluid occurs without warning and without any of the usual signs which indicate to the anaesthetist that fluid has entered the pharynx from the stomach. If a closely fitting mask is in use the danger may be overlooked until the mask is lifted or a stream trickles beneath the pad.

It is suggested that the following method may prove useful in preventing such an occurrence. Lavage may be employed, although experience has demonstrated that emptying of the stomach only makes way for further backward flow of intestinal fluids. It is, however, wise to use it and clean out the stomach and oesophagus with boric acid solution and hot water. The next step is to perform laryngotomy under local analgesia, or even under light anaesthesia, but it is essential in the latter case that the laryngeal reflex should remain active, because vomiting or regurgitation may occur while the larynx is being opened and the stomach tube may be expelled, or vomitus travel beside it into the pharynx. As soon as the larynx is opened, and a cocaine spray used to lessen spasm, chloroform is to be administered through the laryngeal tube to full anaesthesia. The mouth is opened by a gag so soon as the patient is analgesic, and a full-sized oesophageal tube

introduced into the stomach. If the preliminary lavage has been carried out by means of a large tube, and if it has not been expelled, the only further step necessary is to pack very carefully both the upper opening of the larynx and the pharynx around the oesophageal tube. As soon as this is done, the free end of the oesophageal tube must be allowed to drain into a vessel containing a deodorant and antiseptic. It is essential that the tube be introduced and maintained in the stomach, and that the packing round it be tight. The packing of the larynx is done in exactly the same way as that carried out before an excision of the maxilla, when a preliminary laryngotomy is performed. Packing round the oesophageal tube is rendered more easy by cocaineizing the pharynx, as it is essential that there shall be no leak of fluid around the tube.

It may be urged that a preliminary laryngotomy complicates the operation and increases the shock. Whether the latter allegation is valid more extended trial alone can determine, but as the danger which the suggestion aims at removing is a very real one, only serious and proved objections ought to weigh. If an assistant watched the packing and retained the tube in position and repacked should it become necessary, there is less likelihood of the air passages getting any regurgitated fluid even by leakage. Experience has shown that a laryngotomy is a simple operation and should not entail post-operative risks of lung dangers.

I am unable at present to quote cases, as the procedure until its adoption has been proved to be of real value could hardly be urged except in exceptionally grave cases. If, however, it bears the test of extended trial, it would appear to be a plan which might enter into the technique of all operations for the relief of intestinal obstruction where vomiting is a pronounced symptom. Although laryngotomy is mentioned, there exists one good reason for advising tracheotomy rather than the higher operation. The tracheotomy wound is easily closed, is less liable to be forced open in straining efforts. The great objection to the plan proposed is that it destroys the explosive power of coughing, and so clearing the lungs—a most serious point if bronchitis and pneumonia follow the operation, when the patient's life may depend upon his ability to clear his lungs of mucus. The tracheal opening promises better chances of restoring this power, since it can be more securely sealed than is possible after laryngotomy. The tracheal opening also is further from the seat of infection, and this is all to the good. Experience alone can show whether these advantages outweigh the more serious character of the tracheal operation and the increase of shock. The method suggested appears to be valuable to the surgeon in another way. The constant draining of the stomach and intestines unquestionably renders operation easier by abating the distension of the viscera and the chaotic peristaltic movements which commonly complicate such cases.

REFERENCE.

¹ BRITISH MEDICAL JOURNAL, March 26th, 1910, p. 743.

POST-OPERATIVE SUPPRESSION OF URINE:

RELIEVED ON THREE SEPARATE OCCASIONS
BY INTRAVENOUS INFUSION.

BY

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It has been suggested to me that the following case presents at least one point of considerable interest—namely, that three attacks of complete urinary suppression were recovered from as a result of rapid intravenous infusion of saline.

I do not intend to enter into any discussion as to the cause of the suppression; it will be noted that the urine tested before the operation by the ordinary methods (boiling with acetic acid and the nitric acid test) showed no trace of albumen, and the specific gravity was 1020; it contained a small quantity of bile pigment.

The onset of the uraemic symptoms, accompanied by complete suppression, would indicate some previous renal incompetence not shown by the usual tests, and perhaps the case may well be one of so-called "latent uraemia."

The object I have in publishing the case is entirely that of showing the effect on the kidneys of a rapid intravenous infusion; I believe the result is purely mechanical—namely, a rise of blood pressure in the renal area and a consequent renewal of the process of filtration or osmosis, or whatever the precise mechanism may be, which is temporarily in abeyance. It may be that pilocarpine had some effect, but there is no doubt in my own mind, and in the minds of those who saw the case, that the patient's life was saved on three separate occasions by infusion.

After the first attack of suppression the urine was loaded with albumen (to figure 6 on Esbach's albuminometer), the specific gravity was 1010, and when he went home on February 3rd there was still almost the same amount of albumen present, and the specific gravity was 1015.

History.

Mr. D., aged 64, sent by Dr. Baker Young, Liverpool. For many years he has had some indigestion after food, but will not admit that he suffered any inconvenience, except on rare occasions. At any rate, he has always taken ordinary food. Twelve years ago he was in bed with influenza, but there was some doubt whether it was not typhoid fever, as he was in the bedroom for seven weeks; three years ago he had another attack of "influenza," less severe than the first one.

He dated the beginning of his present illness from only six weeks ago, when he had a sudden fainting attack, with a "sinking in the body," accompanied by a feeling of sickness, but no actual vomiting. It is probable that he was a little yellow after this attack. He had his first attack of real pain fourteen days ago in the right side of the chest and body, not very severe, but accompanied by vomiting, shivering, and sweating; he was markedly yellow after this attack, and the colour has shown no sign of lessening, if anything, it has rather deepened. During the last ten days or so he has rarely been free from a sense of great discomfort in the upper part of the body and a feeling of faintness, and has been unable to take ordinary food with comfort. He has been constipated, and the motions have recently been of a lighter colour than natural. He has lost weight considerably.

Examination.

He is a stoutish man who has lost some flesh, is fairly deeply jaundiced, and holds the right rectus tightly contracted. Nothing abnormal can be made out.

Operation.

On November 6th, 1909, an incision was made through the right rectus; there were no stones in the ducts, pancreas a little hard. Gall bladder was very large, tightly distended with fluid, and pointed to the left. It was a dull red colour, and had lost its peritoneal gloss; at the fundus was an area (dull grey in colour) where the wall was very thin, possibly a spot of incipient perforation. It was clearly an acutely inflamed gall bladder. Cholecystotomy was performed, and the thinned grey area at the fundus excised. A culture was taken of the bile in the gall bladder, but no growth occurred. The bile was dark brown, and extremely viscid. It was considered inadvisable to remove the gall bladder because the patient's condition under the anaesthetic became serious, and rapidity was thought necessary.

His recovery uneventful up to November 24th.

From November 6th he had a little bronchitis, and the tube from the gall bladder came away on the tenth day. The bile escaping from the sinus caused some superficial erosion of the abdominal wall for a distance of 2 in. from the wound, but he did not complain of this after the seventeenth day, and the surface quickly healed. He passed from 17 to 20 oz. of urine in the day, but on November 23rd he only passed 12 oz. in twenty-four hours. On the night of November 24th he did not feel so well, the pulse was very weak, he vomited copiously and continuously, and complained much of flatulence and headache. Bile was still coming freely from the sinus. He was very ill indeed all the next day: headache, occasional vomiting, bringing up small quantities of mucus and altered blood, complained of twitching in the legs, skin was dry and hot, respirations feeble and slow, pulse 90; he lay in a semicomatose condition, and had to be roused to drink. He was thought to have uraemia, and a catheter passed found the bladder empty. Pilocarpine was given four-hourly, with the result that sweating was profuse; calomel and Seidlitz powders were tried, and enemata. At 6 p.m. 3 pints of saline were put into the right median basilic vein; he did not feel the incision at all. There seemed to be no improvement, and at 11.15 p.m. 2 pints of saline were run in under the skin of the left thigh.

During the night of November 25th he was very bad, and on November 26th at 10.45 a.m. a catheter passed brought 3 oz. of urine away, loaded with albumen. During the morning he became more conscious, and the vomiting was less, and later on he passed a further 12 oz.

On November 27th he passed nearly 40 oz. of urine; he was very comfortable, had no vomiting, and appeared quite well again.

From this time to November 30th he was very fit, but bile was still escaping from the sinus at intervals, each complete closure of the sinus corresponding to the onset of a rigor; it was therefore decided to keep the drainage as free as possible,

and a probe was frequently passed down the track. On November 30th he vomited all day, complained of flatulence, and was retching continuously, twitching in the legs was pronounced, and again there was a state of semicomatose, from which he was roused to take food, etc. He passed this day only 5 oz. of urine, highly albuminous, with a specific gravity 1015.

On December 1st he passed no urine at all, and a catheter drew none away; the coma and other symptoms were accentuated. At 7 p.m. he was given 4 pints of saline by subcutaneous infusion into both sides of the chest; pilocarpine and the usual purgatives were given. He was extremely ill, and his condition was thought to be hopeless.

On December 2nd, in the early morning, the left median basilic vein was opened and he was given 2 pints of saline rapidly; he did not complain of any pain when the incision was made. Four hours afterwards he passed 4 oz. of urine loaded with albumen and with a specific gravity 1010. His condition again began to improve, and he became rapidly conscious, and passed 22 oz. of urine. He was vastly better. On December 4th he was comfortable, and passed 48 oz. of urine.

On December 5th much depressed; vomited once; urine 40 oz. December 6th, urine 42 oz. December 7th, urine 37 oz.

Up to the end of December he was fairly well, having occasional attacks of great depression. The bile fistula was not closed until the end of the month. All this time the urine was loaded with albumen and he was passing on the average 26 to 30 oz. a day (twenty-four hours).

On January 14th, 1910, he was not so well; passed only 16 oz. of urine in twenty-four hours; he had been up on a couch on the previous day for twenty minutes.

On January 17th and 18th he passed only 16 oz. each day; he was again much depressed and suffered from thirst and nausea. The skin was hot and dry and headache was pronounced.

On January 23rd he passed only 8 oz. of urine loaded with albumen. In the evening he had twitchings in the legs, vomiting, and presented the picture of a man dying from uraemia; he again became semiconscious. Next day he was given rectal salines three-hourly, two pints of saline subcutaneously, and he passed only 1½ oz. of urine.

On January 25th no urine at all passed; another intravenous infusion was performed and two pints of saline were rapidly run into the left median cephalic vein; pilocarpine was again given four-hourly. Again the same result followed. At 10 p.m. he passed 4 oz. of highly-albuminous urine, and although he was very ill through the night, he improved in the early morning. He ceased vomiting and all the symptoms of uraemia disappeared rapidly.

On January 26th he passed 30 oz. of urine, and on the 27th and 28th 40 oz.

When he went home, at his own urgent request, on February 3rd, his urine contained a very large amount of albumen, but he passed 40 oz. in twenty-four hours, and the specific gravity was 1015. His condition was far from satisfactory; he was pale, his tongue was dry and he had great depression at times.

My thanks are due to Mr. Moynihan, who operated on the case, for permission to publish these notes.

FURTHER STUDIES IN HAEMOLYSIS BY WEEVER VENOM.

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In a paper published in the BRITISH MEDICAL JOURNAL, 1907, and in a recent communication to the Pathological Section of the Royal Society of Medicine,¹ I gave the results of a number of experiments with the poison of the weever fish in relation to haemolysis. I showed that with the washed red corpuscles of pigeon, guinea-pig, sheep, ox, horse, and man, haemolysis took place without the addition of, and in the presence of, normal serum, with the corpuscles alone, and without the addition of serum heated for an hour at 56° to 60° C.

This was in contradiction to the results obtained by the French school, in particular by Briot.¹ To quote Calmette² in his review of the venoms:

The poison of the weever dissolves the red corpuscles of the horse in the presence of normal serum which has been heated, but it does not dissolve them in the presence of fresh serum. The serum that has not been heated, therefore, contains a natural antihaemolysin of the same nature as that which I have shown to exist in the case of haemolysis by cobra venom.

It seemed important to investigate this matter further, as I did not feel content with the explanation of Preston Kyes³ in regard to the phenomenon of haemolysis by venoms without added serums—namely, that the toxin (in his case of cobra venom) was an amboceptor which was complemented by the endocomplements of the red cells. Preston Kyes explained the different action of the same venom on the blood of different animals by assuming that there were two groups of blood cells—(1) those that are in themselves dissolved by cobra venom; (2) those