source of the poison. The patient was directly exposed to inoculation on three different occasions: (1) The shears with which he was cut; (2) the pocket knife with which he incised the original wound; (3) the earth of the potato field which contaminated the wound. Moreover, the bacillus being anaërobic, every opportunity was afforded for the development of its toxins by the subsequent conduct of the patient in the treatment of his wound. The soil of the potato field above referred to had been contaminated some thirty years previously by being used as a deposit ground for the excreta of patients during a severe cholera epidemic in the town of Carnarvon.

(b) The usual period for development of the toxic effects of the organism has been variously given as from 1 to 22 days, and it has been further held that the longer the incubation period and the less severe the wound, the less acute the disease and the better the prognosis. In this case it is noteworthy that so far as one can ascertain definitely no marked symptom was observed for at least 22 days, and the wound was in no sense a severe one.

(c) Effects of the antitoxin: These were distinctly well marked, and I attribute the success of the treatment to its early administration, which undoubtedly prevented the case from getting into a prolonged acute stage. At first the effect was, apparently, to increase the severity of the tonic state; but after the minimum dose had been administered (50 c.cm.), the symptoms began to show signs of diminution. Every subsequent injection produced a further though less marked diminution of symptoms until the maximum dose (120 c.cm.) was reached, after which no immediate changes were visible for some time. The temperature and pulse rose after the injections, but fell again in a few hours. The reflexes were more marked after each injection. The greatest number of injections were introduced into the cellular tissue of the flank, but I am not sure whether deep intramuscular injections into the thigh are not better, as absorption is quicker and, owing to the depth of the injected fluid, there is less chance of suppuration. In this case, however, no injection point suppurated. Frequent injections of small doses were found to be better than a single injection of a large one.

(d) Excision of the wound: During this process the arterial blood was observed to be very dark and coagulated instantly; so much was this the case that it attracted the notice of the patient himself. Scraping and cauterisation were by no means so satisfactory as the complete excision wide of the cut eventually performed.

(e) The nervous symptoms: The left arm and left side of the neck showed a distinctly localised tonic of a higher degree than any other part of the body. The left shoulder-joint was completely immobile, the elbow-joint flexed, and the fingers flexed into the palm. The muscular pains were also more intense in these situations. It is difficult to explain the concentration of the poison in these areas, and whether the cause was central or peripheral. Again, the eye muscles were affected, although they are by no means usually so. The diplopia may be explained as being the result of unequal contractions, just as the spasm was specially intense in the left arm. The ptosis, which was present persistently for several days, is also an uncommon condition. The reflexes are, I believe, commonly increased in tetanus, and ankle-clonus has been noticed (Strümpell). Spasm of the glottis was a serious complication of this case, thus again demonstrating the fact of localised areas of concentration of the poison.

(f) Bacteriological examination: The bacilli were discovered plentifully in scrapings taken from the shears, in the soil of the field at the spot where the patient had been working, and in considerable quantities in the excised wound.

I am indebted to Dr. F. N. Menzies for help in the drafting of this report.

The annual dinner of the Pharmaceutical Society of Great Britain will take place on Tuesday, May 15th, at the Whitehall Rooms, Hôtel Métropole, London.

THE ASSOCIATION OF MILITARY SURGEONS OF THE UNITED STATES.—The ninth annual meeting of the Association of Military Surgeons of the United States will be held in New York on May 31st, June 1st and 2nd, 1900, at the New York Academy of Medicine, under the presidency of Colonel C. H. Alden, Assistant Surgeon-General, United States Army.

"GROWING PAINS" AS A SYMPTOM OF RHEUMATISM.

By E. M. BROCKBANK, M.D., M.R.C.P.,
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THE accounts of the valuable discussions at the Clinical Societies of London and Chelsea on the treatment of rheumatism and the prevention of valvular disease as a complication, which appeared in the *BRITISH MEDICAL JOURNAL* of March 17th, afford an excuse, if one be needed, for referring to the important and well known, though often neglected, indication of an attack of rheumatism in children, namely, "growing pains." In this part of the country this term is usually applied, especially outside the profession, to certain vague aches and pains which are supposed to assail the rapidly-growing anæmic boy or girl before or about the age of puberty. These pains mostly occur in the legs, and sometimes in the arms, and are looked upon as being the result of "overgrowing the strength," and apart from the discomfort they cause and the warning they give that the subject of them must "not do too much," and "ought to rest a good deal," they are not supposed to signify anything serious, and are certainly not worth consulting a doctor about. They are also soon forgotten, and no information about them is volunteered in later life, though they are readily remembered when asked after.

But there is no doubt that these growing pains are often— if not always—of rheumatic origin, and the physician inquiring into the cause of a diseased heart, especially of mitral stenosis, should not give up the rheumatic quest without making special mention of them in his investigations, though he has asked about previous attacks of rheumatism, chorea, or even "pains in the joints." The value of the question as being a means of finding out about previous attacks of rheumatism has been impressed on me this year by the experiences of 4 cases which, with another interesting one of earlier date, I will briefly relate:—

CASE I.—A youth, collier, age about 20, was admitted to the Manchester Royal Infirmary with mitral stenosis. He was quite sure that he had never had chorea or rheumatism and had not seen a doctor until just before entering the hospital. When asked about "growing pains" he at once replied, "Oh yes, I had growing pains in my legs when I was at school." He was not laid up with them and did not stay at home, but they were severe and he had to walk slowly to school, keeping up against the wall. They lasted for a week or ten days. Breathlessness on exertion developed four or five years afterwards, and for this he was eventually admitted into hospital, where it was found he had mitral stenosis.

CASE II.—A woman, aged 55, is at present in one of my beds at the Ancoats Hospital suffering from mitral stenosis, with cardiac irregularity and extreme dyspnoea. She is certain she never had chorea or rheumatism, but remembers very well having "growing pains" as a child at the age of 10 and 12. They were very severe, making her cry, and her legs had to be wrapped in flannel, but she was able to sit by the fire and had not to go to bed. She does not remember whether the joints swelled. After this age she was never considered to be "strong," and for fifteen years at least has suffered from dyspnoea.

CASE III.—A man, aged 30, under the care of Dr. Ledward in the Ancoats Hospital, suffering from mitral stenosis, with regurgitation supervening on some slight form of congenital heart disease, probably perforate foramen ovale, for he has been slightly "blue" from birth. He never had chorea or rheumatism, but when young suffered from severe "growing pains" in his knees. He was not kept to bed by them but was unable to walk.

CASE IV.—This case is interesting as being evidence of the wide use of the term "growing pains" in the artisan classes. She is a woman, aged 32, with mitral stenosis in an early stage, and was in Ancoats Hospital up to March 19th. When I first questioned her she was very emphatic in stating that she had never had chorea or rheumatism. She was equally certain that she had suffered from growing pains, beginning from when she was 8 years old. The pains were in her knees, ankles, wrists, and back, and were severe enough to keep her in bed for a week on several occasions, some of which were after her marriage. In this case a doctor was seen, and he called them "growing pains." On my next visit she told me that she had asked her mother about the pains, and she said they were due to rheumatism.

CASE V.—A girl, aged 17, was recently in Ancoats Hospital with typical mitral stenosis. She had eighteen months previously been in the hospital with rheumatism and heart disease. Before her first stay in the hospital she had not had chorea or rheumatism, but when aged 12 she was troubled for six or seven months with "growing pains" in her arms and legs, which were worst in her knees, and severe enough to make walking uncomfortable. She was not obliged to stay at home.

In all these cases, if the inquiry after previous rheumatic attacks had terminated with the history of no rheumatism, chorea, or pains in the joints, the valvular lesion would have appeared to have been non-rheumatic in origin, whereas the specific question about "growing pains" obtained a history

revealing the true nature of the origin of the cardiac trouble. As is well known, the younger the subject of rheumatism, the less are the joints affected and the more likely is endocarditis to attack the valves of the heart, and therefore any mention of pains in the limbs of a child, however slight and unimportant they may appear to the parent, should at once excite the suspicion of the medical man and direct his attention to the heart. Frequent auscultatory examination should be made, and probably endocarditis would often be found assailing the valve structures to a decided degree, though not to an extent which would of itself yield visible signs to the observers, and direct attention to the condition of the heart. The recognition of endocarditis at such an early stage of life, followed by prophylactic treatment directed against the crippling of the valves along the lines indicated in the discussions at the Clinical Societies of London and Chelsea, would diminish the severity if it did not ward off altogether the development of the insidious inflammation which leads to the condition of the heart found in later life.

FAILURE OF RESPIRATION DURING ETHER ADMINISTRATION.

By G. P. SHUTER, M.A., M.B., B.C.CANTAB.,

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ETHER has come to be considered so safe an anæsthetic when administered in a Clover inhaler, and accidents during the administration have become so very rare, that facts as to any marked divergence from the normal course of events must be of considerable importance to physiologists and to others interested in the action of the drug on man.

From this point of view the following case is worth recording for comparison with that related by Mr. W. J. McCardie, of Birmingham, in the *BRITISH MEDICAL JOURNAL* of January 20th, page 138.

In the summer of 1892 a strong, healthy woman, aged 40, was admitted to St. Bartholomew's Hospital to undergo a radical operation for the cure of inguinal hernia.

I gave the patient nitrous oxide gas and ether in the ordinary way with a Clover inhaler of the usual pattern to the top angle tube of which I had fitted a smaller tube supplied with a stopcock for the admission of nitrous oxide gas to the bag. The patient took the anæsthetic extremely well, these were no unusual symptoms, no coughing, no sickness, or struggling or rigidity, while the pulse and colour were good. About midway through the operation, however, the respiration began to be less vigorous, and the lips became a little pale. I at once ceased to give the anæsthetic and removed the inhaler. At this time the pulse was still good, and I saw no reason to interrupt the operation. Gradually the respiratory movements became more feeble, until at last they entirely ceased several minutes after I first observed the signs of failure of breathing. The pulse still remained strong and regular, the colour was fairly good, there being very little cyanosis; the pupils were small, there was no corneal reflex, and the patient was sweating freely. I immediately started artificial respiration and injected a minim of *liq. strychnina* into the wall of the thorax, at the same time I satisfied myself that the air passages were free. The head was lowered, the lower limbs were raised, hot towels were placed on the chest, and the battery was applied to the neck synchronously with the movements for artificial respiration. When the artificial respiration was stopped for a moment no signs of any automatic movement of the chest walls could be seen.

Meanwhile, the patient became increasingly cyanosed, so much so that the lips were of a blue-black colour; the heart slowly failed until no pulse could be felt at the wrist, and the pupils became widely dilated. When these serious symptoms occurred I had been performing artificial respiration for about eight minutes, then followed gradual recovery. The patient began to make some efforts to breathe. She would give two or three slight gasps, and then the chest wall would again be motionless. Her colour slowly improved. Artificial respiration was continued until the breathing had returned to its normal automatic regularity. The pulse continued to improve, the patient eventually assuming the appearance of health that she wore before the onset of the alarming symptoms. The operation was resumed, and as the patient began to show signs of returning sensation I commenced to give chloroform on a square of folded lint, and continued to do so to the end of the operation, which was completed without any further difficulty.

The next day I made a thorough examination of the woman. Except for some pain in the back, where the edges of the table had pressed on her spine, and also for some pain in the chest, due to partially ruptured pectoral muscles, she had experienced no ill-effects from her grave condition on the previous day, nor, in fact, did she in any way appreciate her narrow escape. I found the heart and lungs quite sound and healthy. She could not remember suffering from any shortness of breath, palpitation of the heart, or oedema of feet, nor had she ever had any symptoms that might have led me to act more cautiously or to anticipate difficulties in administering ether.

It will be seen that this case had a general agreement with that recorded by Mr. McCardie. But I must confess that the explanation which he offers—that of spasm of the glottis—

did not at that time, or since, ever cross my mind. The sequence of symptoms, indeed, was by no means such as might have been expected on such a hypothesis. They are, for instance, quite different to those of laryngismus stridulus. In Mr. McCardie's case ether had only just replaced nitrous oxide, and hence his explanation that spasm of the glottis occurred as a result of the new stimulus of the ether is perhaps plausible. But in the case which I have just recorded the patient had been under ether for a quarter of an hour or more, and was well under the influence of the drug—so far anæsthetised, in fact, as to make reflex muscular spasm of any sort a very unlikely event.

In cases of this kind it is essential on theoretical grounds to commence artificial respiration at once. If we perform tracheotomy we waste valuable time, and a few moments lost at this period may be literally a matter of life or death. In fact, it may be said that a few moments during which the air remained stagnant in the lungs may be sufficient to place the patient beyond hope of resuscitation; to lose any time between the cessation of respiration and the commencement of artificial respiration is to court disaster. Is not the whole question one of keeping the patient alive until the respiratory centre has had time to recover itself? It appears to me that direct action of ether upon the respiratory centre of the brain, leading to its failure, is the probable explanation of the occurrences in question. Why they happen in a small number of cases of ether inhalation, and do not happen in the vast majority, it is not easy to explain. But it is no more easy to explain the exceptional readiness with which a minority of patients are occasionally found to respond to doses of other drugs which on the majority are almost without effect. Alcohol is an instance in point.

Most anæsthetists will agree with Mr. Barling that serious laryngeal spasm during the administration of anæsthetics is very uncommon, and, indeed, any spasm at all is very unusual after the first few minutes of the operation if the patient is kept deeply enough under. When a patient has taken enough chloroform or ether to abolish his corneal reflex, we should hardly expect the muscles of his glottis to respond readily or vigorously to the delicate stimulus of the fumes of ether or even to the coarser stimulus of the tip of a finger introduced into the larynx. If the patient is not kept deeply enough under the influence of the anæsthetic, any irritation of the glottis may be sufficient to cause spasm; but spasm of the larynx produced under these conditions need not cause the operator any anxiety provided that no foreign body has found its way into the larynx.

ON SOME PRACTICAL POINTS IN CONDUCTING THE ADMINISTRATION OF ANÆSTHETICS.

By H. BELLAMY GARDNER, M.R.C.S.ENG., L.R.C.P.
LOND.,

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THE administration of an anæsthetic must be regarded as an art, in which, as in every branch of surgery and other arts, perfect facility is only attainable by constant, long-continued, careful practice.

Few members of our profession appreciate surgical dexterity more keenly than the practised anæsthetist, and, conversely, the proficient surgeon sets the highest value upon a trained administrator's skill.

A smooth performance is the outcome of very careful forethought and appropriate training, but these factors in the art of the anæsthetist are apt to receive less attention than is due to them. The minutest details of procedure must be considered in order to gain success, and no action should be neglected which will contribute to the finish of the result.

The moving of a patient from his bed to the operating table often requires a little strategy, even when both are close together in one room. Those who lift a patient should never stand on opposite sides of his body for two reasons: (1) Because the lifters take up too much space to easily traverse an ordinary furnished bedroom; and (2) because the lifting power is much greater when the patient's body can be held close up