A new epoch in surgery will dawn when surgeons realize, as I have done, that they can leave quite a large amount of infection to be dealt with by the inherent resistance of the body to infection.

These notes are written with the sole object of stimulating my seniors and contemporaries who have more material to carry out the lines I have suggested, and to more and more practise primary suture in their cases, and above all to give up once and for all the use of open rigid drainage tubes.

Sir Bertrand Dawson, G.C.V.O., has kindly added the following note on the treatment of streptococcal empyemata:

With regard to empyemata, my experience is that the pneumococcal ones do well with immediate closure after evacuation, but not the streptococcal. These latter need to be drained for two or three days, with or without Carrel tubes, and then they can be sewn up.

I agree that streptococcal infections must be dealt with on different lines from staphylococcal, pneumococcal, and other infections, but in civil practice it is very rare to meet with streptococcal empyema.

ANOMALOUS MUSCULAR ACTION IN NERVE INJURIES.

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THE precise action of an individual muscle is not always easy to determine in the uninjured limb, since a particular movement is in most cases brought about by the resultant action of many muscles and not by one alone. When a nerve trunk is severed and the muscles supplied by it are put out of action, the muscles supplied by the uninjured nerves of the same region sometimes give rise to surprising movements. It is probable, in fact, that the movement resulting in these cases is such as never occurs in a limb with properly balanced muscles. While this movement is in many cases of mere academic interest, it occasionally happens that it may flatter the surgeon who has performed a nerve suture, giving him the impression that muscular recovery has begun, whereas an attentive examination of the muscles causing the movement may show that his conclusion is premature.

One of the most striking instances of this that have come under my notice is that when the median and ulnar nerves are divided in the upper arm, active flexion of the wrist is often still present, being brought about by the extensor ossis metacarpi pollicis. Another anomaly is seen in posterior interosseous paralysis, namely, the first dorsal interosseous muscle can cause a lifting of the thumb easily confused with commencing recovery of extension of that digit. These two anomalous movements clearly depend upon the difference of the plane in which the metacarpal bone of the thumb lies relatively to the plane of the four remaining metacarpals.

Other unexpected actions are that the terminal phalanx of the thumb can be actively extended in cases of posterior interosseous paralysis, the extension of course being brought about by the insertion of the abductor pollicis into the dorsal expansion of the extensor tendon; and that in ulnar paralysis the index finger can be slightly abducted by the obliquity of the extensor tendons passing to that digit. In persistent paralysis these movements, aided by use, massage, and electrical stimulation, may acquire some importance.

Some of these unsuspected muscle actions, it is true, may indicate merely that one's memory for anatomical detail requires furbishing, and anatomists could doubtless furnish many more instances. There is no doubt, however, that a partially paralysed limb offers a rich field for the investigation of the essential action of individual muscles.

Another anomaly which may often be observed is due to the general preponderance of the flexor muscles. This is seen in its most marked form in lesions of the upper motor neuron—for example, in a case of hemiplegia. If the wrist of such a patient is passively extended, the fingers curl into the palm and exercise a quite perceptible grip. In a lower motor neuron paralysis—for example, in complete lesion of the median and ulnar nerves in the upper arm—this action is also observable, though it is not so evident, and may give rise to a false notion that

recovery of active flexion of the fingers is in progress. In some cases it certainly indicates that the elasticity, and therefore the nutrition, of the finger-flexors is being maintained, but in others it points to essential fibrosis and shortening of those muscles, and is consequently of grave significance. In the latter case it usually betrays neglect of treatment. If the fingers can be straightened only while the wrist is flexed this condition of fibrosis is present in the flexors of the fingers. In a most helpful paper Professor Langley¹ has shown that the danger of stretching a paralysed muscle has been somewhat overstated. It is questionable, at any rate, whether it is preferable to risk stretching the muscles or to encounter a case of musculospiral paralysis so assiduously treated on a "cock-up" splint that the wrist, by reason of fibrosis of the extensors, could be brought neither up nor down.

It is surprising, again, to find what little muscular disability may result from complete division of the median nerve at the wrist. In a case recently operated upon there was, except for most intractable trophic ulcers over the median distribution in the hand, which was completely anaesthetic, practically no disability, and the lesion might easily have been overlooked. The abductor pollicis was completely paralysed and its situation represented by a fossa on the radial side of the metacarpal bone, but the loss of this muscle seemed not to affect the utility of the thumb. As for the movement of opposition, this was quite efficiently carried out by the adductores pollicis in combination with the long and short flexors, both heads of the latter appearing to be active in spite of the complete division of the nerve an inch above the wrist. It is interesting to note that within a month the trophic ulcers healed for the first time, but there was still complete trophic loss. This may only indicate, however, that the hand had received better protection after the operation than it had previously obtained.

Cases such as this are of interest from the ease with which nerve lesions may be overlooked, as pointed out by Mr. T. E. Hammond² in the case of the internal popliteal. They also illustrate the point that if a nerve is sutured without a previous careful examination of both muscular and sensory loss, the operator may claim results to which he is not entitled. This may account for some cases of atypically early recovery after nerve suture.

REFERENCES.

- ¹ Langley: The effect of intermittent stretching on muscles and nerves after suture, *BRITISH MEDICAL JOURNAL*, February 2nd, 1918.
² Hammond: The involvement of the external and internal popliteal nerves in lesions of the sciatic nerve, *BRITISH MEDICAL JOURNAL*, April 6th, 1918.

EARLY CARDIAC BREATHLESSNESS AND "BUFFER-SALT" DEFICIENCY IN THE BLOOD.

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THE review in the *JOURNAL* of June 22nd (pp. 702-4) of the report of Dr. Lewis dealing with the causation of breathlessness on exertion in early cardiac cases is most interesting, but may I be allowed to point out that the expression "buffer salts," first coined in Germany for an effect described and measured originally in Britain, conveys an erroneous impression, because the protective action against variations in acidity or alkalinity is due not to the inorganic salts, carbonates, or phosphates, of the plasma, but almost in its entirety to the amphoteric proteins?

This protective action was fully described, and a quantitative method supplied for its estimation, by the writer and his colleagues Roaf, Wilson, and Whitley at the biochemical laboratory of the University of Liverpool over a decade ago, the results being published in the *Proceedings of the Royal Society* and the *Bio-chemical Journal*.¹

The action was described under the title of the "reactivity of the serum," as distinct from the "reaction of the serum" at any given moment, and by estimating the amount of decinormal alkali and acid necessary to titrate from one definite value of hydrogen ion concentration to another, marked by the mid-point or neutral point to two coloured indicators, namely, phenolphthalein and methyl orange, there was assigned a quantitative value to the "reactivity" or protective power of the blood and tissue