ON THE METHODS OF PERCUSSION EMPLOYED IN EDINBURGH AND GLASGOW; WITH SPECIAL REFERENCE TO THE IMPORTANCE OF MINIMISING THE STROKE IN MOST CASES IN THE DELIMITATION OF AREAS.

By W. T. Gairdner, K.C.B., M.D., LL.D., F.R.S., formerly Professor of Medicine, University of Glasgow.

In the course of having to superintend the studies in the medical art of two sons in succession over a considerable term of years in Glasgow, I have had my attention directed to certain differences in the methods of Edinburgh and Glasgow tuition, of which one, at least, has seemed to be of so much importance, that I have now determined to devote this article to it, in the hope that both in Edinburgh and elsewhere matters involving fundamental principles may be more fully considered, and if possible acted on more in conformity with these physical principles, and therefore with more general uniformity and consent than hitherto.

The matter alluded to is the method to be employed in percussion, with special reference to the force of the stroke, and the conclusions to be drawn from the differentiation of results in various areas in which delimitation is of great consequence. It is no longer doubtful to me, judging from what has been told me, in particular by the younger of my medical sons, that in this respect the manner of delivering the stroke in Edinburgh and Glasgow differs to an appreciable degree, and the difference is probably, if not certainly, due to the general instructions which, in thirty-eight years of a professorship in Glasgow, I have had occasion to impress upon a corresponding number of classes of students, both in systematic and ward teaching. But as it has only occurred to me recently to attach this kind of importance to my own instruction, and as I should be very unwilling to overestimate the difference in question, I am glad to be able to avail myself of words committed to the press so early as 1885, and primarily intended, not for any controversial purpose, but simply for the full clinical exposition of what seemed to emerge from the consideration of a particular case; and I am far from asserting or claiming that the views expressed are in any respects absolutely novel or peculiar to my own teaching. It will remain for each reader of the following remarks to arrive at conclusions for himself; but it is not too much to suppose that matters which have occupied my own attention during a long career as a teacher, and have been deliberately formulated in the oral teaching of a considerable school during so many years, may have been so dealt with under the influence of personal suggestion as to demand either some definite criticism or some rectification of the methods.
referred to on the part of others; and as my own influence is now permanently withdrawn from direct teaching, it is only through an article like this that an erroneous bias existing, if any, can be further controlled.

In the *Medical Times and Gazette* of 19th December 1885, very closely corresponding with the decease of that once eminent and excellent journal, I find that I made the following remarks in commenting upon a case in which the percussion of the abdomen had to be regulated so as to discover a certain amount of thickening of the great omentum. The condition in question was demonstrated on many occasions in this case, and was partially illustrated by a diagram, which, however, it is not considered necessary to reproduce here. The conclusion reached was (omitting details for the present), that “there was thickening of peritoneum generally, and especially of the great omentum, by fibrinous deposits, including perhaps some fluid, but not such an amount as to give rise to physical signs as such.”

On this occasion I so far diverged into discussion of the general subject as to furnish forth a report which will serve me well in reference to the present article, and from which, therefore, I take the following somewhat extended extract:

"Upon this subject of the *minimised percussion-stroke*, I should like to take this opportunity of making a few remarks incidentally, because it is one, in my opinion, erroneously, or at least ambiguously, stated in some of your text-books; and practical errors and confusions arising from this source are not uncommon in my experience.

"Most persons, and almost all beginners, in employing percussion for the delimitation of organs, *err by percutting too hard*. The desire is, naturally enough, to get a definite and recognisable *quantity* of sound; and, by percutting hard, more sound is got, of course, than when, as in the observations just referred to (case of Mary Jane S.), a carefully minimised stroke is employed. But in increasing the quantity of sound so as to make it apparently or really more easily audible, you are, in most cases, *exactly in a corresponding degree reducing the value of your results*. In other words, the carefully minimised stroke gives you approximately exact definitions: while the stronger stroke necessarily gives you less exact, or wholly inexact, limits of dull and clear areas under like circumstances; the degree of inexactness or vagueness of the results increasing immensely with every degree of added force employed, so that, according to the quite ordinary mode of percussion used by many persons, and by almost all young or inexperienced persons, nothing like exact results can ever be obtained at all. Both in the case of Mary Jane S., for example, and in that of Jane M., all the best results of our percussion would have wholly escaped us had we employed such a force of percussion-
stroke as I observe many of you employ through an instinct and habit that it seems to take much teaching to get over.

"Piorry, the great master of mediate percussion (as he first called it), and unquestionably a very great man in this art, appears in his numerous writings to proceed throughout on the assumption that percussion operates directly downwards, or in the direction only of the impact, in the way of educing the characteristic sound; and accordingly he speaks always of superficial and of deep percussion (percussion profonde) as if they were facts of the same order and of equal exactness in the delimitation of organs. No doubt Piorry had ways of his own of attaining valuable results, both from superficial and from deep percussion, and of thus obviating practically some of the faults of his method, or, at all events, of his doctrine. But he left a legacy of fatal confusion to his successors, by teaching that for every organ or structure in the body there was a process of delimitation of its deeper relations, which he implicitly regarded as equally available for exact definition with the superficial; the means for deep percussion being simply a stronger percussion-stroke, which, as I have already said, can never under any circumstances give an exact, or even approximately exact, result in delimitation at all. For it is a physical law which no amount of experience can evade or set at nought, that percussion does not operate directly downwards or in the direction of the impact only; but, in proportion to the strength of the stroke, laterally, diagonally, and in every possible direction in educating sound. And therefore, as I said before, deep percussion (so-called) is necessarily inexact percussion; and what you gain in volume of sound, by strengthening your stroke, you lose, and far more than lose, in definition,¹ according to a physical law which no amount of skill can overcome. To trace this principle out into a refutation of all the nonsense that has been written in books about the deep and superficial, absolute and relative, limits of certain organs according to percussion, would occupy too much time. I will therefore pass to one consideration only, which is very directly related to the subject of this clinical lesson.

"What I mean by a carefully minimised percussion-stroke is this: You are to percuss so as to elicit the distinctions of sound depending on air-filled or not air-filled viscera when superficially placed in reference to the abdominal wall; but you are not, as a rule, to strengthen your stroke beyond what is absolutely necessary for this purpose, at least when you are in search of objects

¹ The introduction of Wintrich's hammer in percussion was, from this point of view, a great misfortune; and after using it for some years, more or less, from my earliest initiation into physical diagnosis, I abandoned it entirely on this account, except in eliciting the cracked-pot sound; because I found that the result of using it habitually was to cultivate a habit of too strong, and therefore inexact, percussion. Yet I found the hammer, in the hands of Traube and others, almost universal in Berlin in 1872.
such as the thin edge of the liver, which closely underlies the surface, or rather the wall of the abdomen.\(^1\)

"When your object is (as it may very well be) to determine not limits, but the qualities of large masses of sound as elicited by strong percussion, remember always that what is gained in volume is more than lost in exactness of delimitation; and that by no sort of management is it physically possible to determine accurately an edge, or limit, or any kind of definite form of an object, even half an inch below the wall of the thoracic or abdominal cavity under ordinary circumstances. Hence you can determine with tolerable accuracy the fact and the extent of a thickened omentum; but you cannot determine with like accuracy, by percussion alone, the enlargement of a mass of mesenteric glands; unless, indeed, they are thrusting aside the intestines, and (what is quite unusual in fact) thus becoming superficial. By using palpation along with percussion you can sometimes, but not always, distinguish the two conditions. About this diagnosis I have something to say further on.

"Meanwhile, observe the precautions which, in this case and in the other, we actually employed, and have reason to urge upon you as necessary in exploring the abdomen by percussion in search of thickening of the great omentum or any similar lesion. The first point is to determine the existence, or the absence, of gravitating fluid in such quantity as to affect separately the percussion. In this case our diagnosis on this point, by the quite ordinary tests, was in the negative. Then we had to consider that under normal circumstances the intestinal canal, in one or other of its divisions, occupies the whole anterior wall of the abdomen, giving rise to a well-defined, though not identical, tympanitic note, which is reached by a nearly equal force of percussion-stroke all over the anterior surface. If, therefore, we can find even a few points at which a very gentle tap elicits this normal quality of sound, we know that under like physical conditions the same gentle percussion-stroke, and no more, ought to elicit a more or less similar tympanitic note all over; and if it is otherwise, we ought to study the facts carefully in detail, and to know, if possible, the reason why. These points or areas of quasi-normal percussion afford us the necessary data, then, for what I call minimising the stroke. Now, if we find that over a particular area corresponding anatomically with the area of the great omentum, or of some portion of it, there exists a dull percussion which contrasts notably with the quasi-normal areas just referred to, being absolutely without sound to a minimised stroke, while to a very slightly stronger stroke it gives a tympanitic percussion quite like the quasi-normal

\(^1\) I have again and again been obliged to demonstrate to young and even to some skilful operators, that the lower edge of the liver has been shown by them as half an inch, or even an inch, too high, in consequence of the percussion-stroke not being carefully minimised.
areas, to what conclusion can we possibly come but that within this area of abnormal percussion there is something interposed between the abdominal wall and the air-filled intestines; something which is thick enough to differentiate the percussion, but not so thick as to give dull percussion to a stronger stroke; which is thus, as I expressed it in the report, ‘easily penetrated’ by percussion? And if this ‘something’ is in the anatomical position of the omentum, why should it not actually be the omentum, involved in a possibly more general peritoneal morbid process, but presenting (owing to its double fold) the changes due to this in a more marked form? And although this diagnosis may be confirmed and strengthened indefinitely by palpation, showing a diminution of elastic resistance over a like area as compared with other parts of the abdomen, it may, and often does, emerge with a fair amount of accuracy and security from the percussion alone, employed in the manner now described.”

The only circumstance which makes the remarks in this particular case of great value for my present purpose, is that it was one of many in which absolute accuracy of result depended in a very peculiar sense on the method employed; but it will be observed that the principles set forth as regards the importance of “minimising the stroke” have an application beyond the abdomen or the particular investigation referred to. It is these principles I am most anxious to maintain in this article, and therefore I shall endeavour in what remains of it to show that the differences above referred to between the Edinburgh and Glasgow schools in reference to percussion may possibly and indeed probably, involve questions extending to the fundamental basis of acoustic principle, on which insufficient stress has hitherto been laid. My object, in other words, is to show that wherever percussion is employed with a view to delimitation, a carefully minimised stroke (in the sense above defined) is essential to correct practice, and that it is vain to expect really accurate results unless this condition is systematically attended to. I am very far from persuading myself that the manipulations of experienced hands have not, in fact, led to fairly good results in a large proportion of cases; but for teaching purposes it seems to be most important that beginners at least should be started in the right line, and not involved in the intricacies of a terminology which is itself demonstrably out of accord with the laws of acoustics. When, for example, the expression “deep percussion” is employed, as it is by Piorry and others, and when it is thus made to appear that the deep limits of an organ can be indicated by percussion in similarly exact terms with the superficial areas, a positively wrong direction is given to procedure, and the results cannot fail to indicate in some cases the divergence from physical laws tacitly assumed in the process. There is indeed an apparent sacrifice in respect of
the amount of sound produced, but the sacrifice is a necessary one, and is amply compensated by the greater value resulting from better methods. I would instance in particular the percussion of the heart and of the lower edge of the liver as being among those which in my experience have been most perverted or rendered indeterminate by the employment of wrong methods. I trust, therefore, that this article will be accepted in the spirit in which it is intended, not as a claim of priority or undue dogmatism, but as a simple attempt to set forth principles which have been apt to be lost sight of in daily use.

The discontinuance on my part of the habitual use of "Wintrich's hammer," as referred to in the footnote to the above, is a very marked and almost unconscious result of the principles referred to, the use of the hammer having been adopted by me at the instance of the late Professor Hughes Bennett not less than fifty years ago, on its being first imported into this country, and (notwithstanding the strong temptations to its use in class teaching) discontinued, as appears in the note, in everyday use, although always retained for certain cases in demonstration, at some time prior to the year 1872, after a prolonged and varied experience.

THE TREATMENT OF THE MUSCULAR, HÆMIC, AND MECHANICAL FACTORS IN HEART DISEASE.¹

By ALEXANDER MORISON, M.D., F.R.C.P. (Lond. and Edin.), Physician to the Great Northern Central Hospital and the Children's Hospital, Paddington Green, London.

(Concluded from p. 324.)

LECTURE II.

In my last lecture I considered the influence of disorder of the visceral muscle and of the muscles of respiration upon diseases of the heart, and dealt shortly with the therapeutic agents at our command for assisting that muscular factor to recover its tone when lost. It was also stated, however, that the somatic or skeletal muscles of the body had an important influence upon the distribution and conduct of the circulation. In resuming our theme, it is with the voluntary muscular system that we are concerned. Every organ, be it brain, stomach, intestine, liver, kidney, or any other gland, which is in a condition of functional activity, is also in a state of more or less physiological congestion. It holds more blood than it does during functional quiescence. The heart itself may be seen shortly after food to contain more blood than during periods of fasting. In

¹ Lecture delivered at the London Polyclinic in February 1904.