sent to an infants' school. The teacher asked him to hold out his hand. He tried but failed to perform the act of supination. The teacher grasped his hand and tried to forcibly supinate it but was unable to do so. She then took the boy home to his mother and told her that there was something wrong with his arms. He was shown to two medical men (since deceased) who expressed the opinion that his arms were in the same condition at birth, suggested an operation, but did nothing. His mother states that previous to the abnormality being noticed he had not suffered from any acute illness or fever. He has never had an accident to his arms. He has never had rheumatism. There is no history of syphilis either congenital or acquired. There are no cicatrices about his elbow or other joints to indicate old suppurative disease. He never remembers any swelling of his joints. Necessarily he has never had the power of supination and pronation, and his forearms were in exactly the same state when first I saw him six or seven years ago. He works every day as a fitter's helper. In doing his shopping he finds it most inconvenient to receive change, as he cannot take it in the palm of his hand, but can only grasp it between his index finger and thumb.

Fig. 3.—Skiagraph of left upper radio-ulnar articulation (congenital synostosis).

The morphological condition is a rare one. I have been unable to find any similar case recorded in any surgical work. Dr. Hepburn, Professor of Anatomy at Cardiff University College, who has kindly consulted for me the *Transactions* of anatomical societies and various works of reference on anatomy, cannot find a parallel case reported. In looking over the comparative anatomy of the mammalia for a homologue, we must look back some distance from *homo* before we come across a loss in the power of supination and pronation. In many mammals the bones of the forearm (antebrachium) are more or less coalesced. In bats and some ungulates—for example, the ruminants—the radius is enlarged at the expense of the ulna, of which only the proximal third remains ankylosed. The radius and ulna are completely ankylosed in camels. Among some insectivora they are ankylosed inferiorly. They ankylose at both ends in sirenias. They are never ankylosed in carnivora or rodentia, or monkeys and apes.

In man in the second month of embryonic life the elbow-joint appears. At first the radius is in front of the ulna; afterwards the radius moves sideways so as to lie parallel to the ulna, and by the rapid growth of the head of the radius the ulna becomes flattened or concave so as to form the lesser sigmoid cavity of the ulna.¹

In the case here described we are dealing with a condition which presents a partial return to one of the lower vertebral forms of the elbow-joint, whereby, owing to an arrest of growth, the joint cavity has failed to develop and the tissue which ought to have advanced to the formation of joint surfaces has remained in the embryonic condition until it was transformed into fibrous tissue and afterwards into bone, thus constituting a synostosis.

The radiographs which illustrate this paper were done for me by Mr. W. Jones Greer, F.R.C.S., whose kind offices I beg to acknowledge.

REFERENCE.

¹ Karl v. Bardeleben. *Handbuch der Anatomie des Menschen*. Vol. xi.

THE INFLUENCE OF POSTURE ON THE NORMAL CARDIAC SOUNDS AND ON THE NORMAL CARDIAC DULLNESS.

By WILLIAM GORDON, M.D., F.R.C.P.,
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THE changes in cardiac murmurs which occur on change of posture are so pronounced as to suggest the inquiry whether alteration of position also affects the normal heart sounds. Careful observation of normal hearts will soon convince any one that change of position does affect the normal heart sounds, sometimes slightly, sometimes markedly. The change produced is a change in the character of both sounds. It will generally be found that, in the upright position, the first sound is sharper, whilst the second sound is duller, than in the recumbent position, so that the two sounds are much more like each other in the upright position than they are in the recumbent. Indeed, it may be fairly said that the "lub-dup" of the textbooks is, in most cases, a true description only of the sounds when the body is recumbent, and that "lup-lup" more exactly describes them when the body is erect.

How can these differences be explained? I have shown elsewhere¹ that the changes in cardiac murmurs produced by

Fig. 1.

Fig. 2.

change of position can be explained partly by the action of gravity on the intracardiac currents, partly by the flattening of the chest which occurs, as I have pointed out, when the patient lies on his back.

As the changes now referred to are changes in the character of the sounds, differences in the depth of the chest cannot be held to account for them, and the question reduces itself to this: "Can the action of gravity account for the changes?"

If the position of the valves of the heart in the upright and recumbent positions are considered it becomes obvious that, when the first sound is produced, a weight of blood is resting on the mitral and tricuspid valves if the person examined be recumbent, but that if the person be erect no such weight rests on these valves. Also it is obvious that, when the second sound is produced, a weight of blood is resting on the aortic and pulmonary valves, if the person be erect, but that if he be recumbent no such weight rests on these valves. Therefore the question resolves itself into this (since the first sound is admittedly in part valvular): "Does a valvular sound vary according as a fluid weight does or does not rest on the valves producing it?" The following experiment shows that it does:

A glass tube A, 3 cm. in diameter, has one end open and the other drawn out to a neck. A membrane, B, of inelastic waterproof material is stretched not quite tightly over the broad end. The neck is connected with a ball syringe, C,* by a short length of rubber tubing, D. The whole apparatus is filled with water, so that a slight sudden pressure on C makes B suddenly tense, and thus produces a sound. It will be found that when A is held, as in Fig. 2, with B upwards, that is, with no weight of fluid on B, this sound is sharper than when A is held with B downwards,

* The ball syringe is kept base upwards in both experiments to prevent any air bubbles it may contain from getting into the tube A.

as in Fig. 1—that is, with the weight of the water in a resting on B.

The observed changes in the normal heart sounds produced by change of posture may therefore be reasonably explained, at least in part, by the different relations of the valves to the weight of blood in contact with them in the different positions.

Fig. 3.—Diagram to illustrate the change in the limits of cardiac dullness with change of position.

Posture also affects the deep cardiac dullness. In the erect position the cardiac dullness drops nearly a rib's breadth (on an average) further from the clavicle than in the recumbent position, and (in the average adult) becomes about $\frac{1}{2}$ in. wider from side to side at the level of the fifth costal cartilage, the increase being greater to the right than to the left, that to the left being about $\frac{1}{2}$ in. The accompanying table, of 36 consecutive unselected cases with normal hearts, illustrates these changes.

Thirty-six Unselected Cases with Normal Hearts.

Sex.	Age.	In Hospital for—	Changes on Rising from Recumbent to Erect Posture in—		
			Width of Dullness.	Height of Dullness.†	Depth of Chest.*
M.	7	Circumcision ...	+ 1 in.	- 1 rib, 1 space	+ 1 in.
F.	7	Accident ...	+ 1 in.	- 1 " 1 "	+ 1 "
M.	10	Accident ...	+ 1 in.	- 1 " 1 "	+ 1 "
M.	13	Accident ...	+ 1 in.	- 1 " 2 "	+ 1 "
M.	13	Hypospadias ...	+ 1 in.	+ 1 "	+ 1 "
F.	14	Flat-foot ...	No change	No change	+ 1 "
M.	15	Accident ...	+ 1 in.	- 1 in.	No change
M.	15	Accident ...	+ 1 in.	- 1 rib, 1 space	+ 1 in.
F.	16	Housemaid's knee...	+ 1 in.	- 1 " 1 "	+ 1 "
F.	16	?	+ 1 in.	- 1 " 1 "	+ 1 "
F.	16	Lateral curvative ...	+ 1 in.	No change	+ 1 "
M.	17	Accident ...	+ 1 in.	No change	+ 1 "
M.	17	Accident ...	+ 1 in.	- 1 rib	+ 1 "
M.	17	Varicocele ...	+ 1 in.	- 1 " 1 "	+ 1 "
M.	17	Hammer-toe ...	+ 1 in.	- 1 " 1 "	+ 1 "
M.	18	Hernia ...	+ 1 in.	- 1 " 1 "	+ 1 "
M.	18	Accident ...	+ 1 in.	- 1 " 1 "	+ 1 "
M.	18	Varicose veins ...	+ 1 in.	No change	+ 1 in.
F.	18	?	+ 1 in.	No change	+ 1 "
F.	19	Synovitis, knee ...	+ 1 in.	- 1 rib, 1 space	+ 1 "
M.	20	Varicose veins ...	+ 1 in.	- 1 " 1 "	+ 1 "
F.	21	Synovitis, knee ...	+ 1 in.	- 1 " 1 "	+ 1 "
F.	22	Phlebitis ...	+ 1 in.	- 1 " 1 "	+ 1 "
F.	23	Hip disease ...	+ 1 in.	+ 1 rib, 1 space	+ 1 "
M.	24	Varicocele ...	+ 1 in.	- 1 " 1 "	+ 1 "
F.	24	Tuberculous glands	+ 1 in.	- 1 " 1 "	+ 1 "
F.	26	? Appendicitis ...	+ 1 in.	- 1 " 1 space	+ 1 "
M.	29	Perineal abscess ...	+ 1 in.	No change	+ 1 "
M.	30	Sebaceous cyst ...	+ 1 in.	- 1 rib	+ 1 "
M.	30	? Carcinoma, penis.	+ 1 in.	- 1 " 1 "	+ 1 "
M.	31	Varicose ulcer ...	+ 1 in.	- 1 " 1 space	No change.
M.	33	Tuberculous knee...	+ 1 in.	- 1 " 1 "	+ 1 in.
M.	34	Talipes ...	+ 1 in.	- 1 " 1 "	+ 1 "
F.	35	Ulcer of leg ...	+ 1 in.	- 1 " 1 space	+ 1 "
F.	36	" Uterine" ...	+ 1 in.	- 1 " 1 "	+ 1 "
M.	43	Tuberculous ankle..	+ 1 in.	- 1 in.	+ 1 "

* Antero-posterior diameter measured at nipple level.

† Nearness of upper limit of dullness to clavicle.

+ Indicates nearer to clavicle.
- Means further from clavicle.

It will be seen that in several cases the upper limit does not alter, and that in three cases it alters in the reverse direction to the usual one. The change, however, in the width of dullness is strikingly constant, so much so that it seems curious that it has not been observed before. [The same change in width of dullness is even more striking in disease. Thus, in

a case of hypertrophy and dilatation due to combined aortic and mitral disease, I have found the dullness on recumbency only 5 in. wide, whilst in the erect position it was actually 8 in. wide.]

How are these changes to be explained? I think in this way: On assuming the erect position the heart tends to fall lower in the chest, and, owing to the forward slant of the anterior part of the diaphragm, to also fall forward against the front wall of the body. Thus the cardiac dullness should tend to sink somewhat lower, and to widen out when the upright position is assumed, which is just what usually happens. [In disease, where the weight of the heart is increased, this drop on change to the erect posture may be very marked, the apex being sometimes found to beat, when the patient stands or sits, in a lower space than when he lies on his back.]

In a much smaller number of cases, however, the upper limit of dullness actually rises instead of falling. If this is due to the heart being anatomically more firmly held up than is usual, and to its upper part coming forward into contact with the chest wall when the person stands, it might be reasonably expected that the dullness in those cases would widen less than usual, and this is actually found to be the case in the very few examples included in my table, in each of which the widening was only $\frac{1}{2}$ in.

Whether the explanations I have offered of these changes in cardiac physical signs produced by change of posture be correct or no, I think that the importance of the changes themselves will be considered sufficient to justify me in bringing them to the notice of the Society.

REFERENCE.

1 BRITISH MEDICAL JOURNAL, March 15th, 1901, Posture and Heart-murmurs.

AN AID TO PROGNOSIS IN TYPHOID FEVER.

By ROBERT M. SIMON, M.D., F.R.C.P.,

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For a doctor to be able to form an opinion as to the probability of recovery in cases of enteric, must undoubtedly be of service to a patient and an encouragement or reason for extra care to the physician. In forming an opinion as to the chances of recovery or of death, the experience of the last fifteen years has led me to look to the amount of urine passed in the later stages of the disease as a guide of the utmost value.

Polyuria is a well-known symptom at the end of nearly all febrile disorders, but I am not aware that special attention has been paid to it in connexion with typhoid fever, in which, however, it is a very marked and conspicuous condition.

Towards the beginning of the fourth week, seldom earlier, sometimes a little later, the urine increases in quantity from 30 oz. or thereabouts to 60, 80, or even 100 oz. daily. For the last nine years, in order to confirm or disprove my estimate of the importance of this fact, I have had daily observations made of the amount of urine passed by every patient suffering from enteric fever. It was found that polyuria occurred not only in every case that was doing well, but also in many cases of great severity in which no general improvement or amelioration of symptoms could be observed. It was found that even in severe cases, if polyuria occurred, the patients all recovered.

It does not appear to be necessary, in order to estimate the value of polyuria as a means of prognosis, that the patient should be in a state to voluntarily empty his bladder.

I saw recently at Great Malvern a gentleman, aged 58, who had in the fourth and fifth weeks of an attack of typhoid lost control of the bladder sphincter. His general condition was one of extreme prostration. His temperature was continuously high, his tongue dry, his abdomen distended, heart sounds feeble, and pulse dicrotic. Recovery seemed to be out of the question, and my visit had been suggested to satisfy absent relations. I learnt that it was impossible to keep his bed dry on account of the enormous amount of urine voided. On this symptom alone I ventured to give a favourable prognosis, which was justified by his ultimate recovery.

The importance of the absence of polyuria in a case supposed to be doing well, as shown by a normal temperature and a quiet pulse, was well exemplified recently in the case of a boy under my care in the General Hospital. Despite a very real general improvement, I deprecated attaching too much importance to his general well-doing, as it was not associated with an amount of urinary excretion such as was