

The cephalic murmur of anaemia / by G.A. Gibson.

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Gibson George Alexander, 1854-1913.
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Publication/Creation

[London?] : [publisher not identified], [1882?]

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THE CEPHALIC

By G. A. GIBBS

Fellow of the Royal College of Physicians
Anatomy and Physical Dis

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*Antonie's Clipping no. 10
Vol. 1, Nos. 1 and 2, February 1901
London Medical Record, 1901
1. See also in South African
Journal of Medicine, vol.

THE CEPHALIC MURMUR OF ANÆMIA.

By G. A. GIBSON, M.D., D.Sc., F.R.S.E.,

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IN the early part of last year M. Tripier, of Lyons, published an interesting memoir* upon an important phenomenon which he observed in many cases, more especially in conditions of anæmia.

By means of an abstract in the *London Medical Record*,† I brought his investigations before the notice of the profession in this country soon after the appearance of his paper. In anæmia, and certain associated states, Tripier found that a murmur could be determined by auscultation over the cranium. He described it as always systolic in rhythm, never continuous, not modified by change of posture, but altered by pressure on the carotid arteries, and varying with the general condition of the patient. In a subsequent contribution‡ he has reconsidered the conclusions at which he previously arrived. He finds most of his statements fully supported by the evidence which he has accumulated, but sees reason to modify his former conclusion regarding the position of the maximum intensity of the murmur.

In his first paper, he described it as being most distinct over the temporal region, especially of the right side. But it had not then occurred to him to investigate the state of the orbit; and, since writing that memoir, he has discovered that on auscultation of the eyeball the murmur can be heard more clearly in that position, than in any other part of the cranium. He points out that the murmur is clearly of local origin, as it not unfrequently exists apart from any cardiac murmur, and cannot, therefore, be transmitted from the heart. It gradually gains intensity as the anæmic state becomes more profound, and when the patient improves it steadily diminishes.

The murmur over the orbit is heard at an earlier period than that in the temporal or other region of the head, and, as health is regained, it is longer in disappearing than that heard elsewhere.

Tripier regards this murmur as arising in the terminal portions of the internal carotid artery, and thinks that its maximum intensity over the orbital region is a strong argument in favour of such an hypothesis.

* Recherches Cliniques sur le Souffle Céphalique chez l'Adulte (*Revue de Médecine*, vol. i, Nos. 2 and 3, February and March 1881).

† *London Medical Record*, April 1881.

‡ Note sur le Souffle Céphalique de l'Adulte considéré au niveau des Régions Orbitaires (*Revue de Médecine*, vol. i, No. 10, October 1881).

I am of opinion that the explanation given by Tripier of the mode of production of this murmur is inadequate, and I wish to advance another hypothesis which appears to have more evidence in its favour. Such is my reason for entering into a consideration of this question at present; and, in order to explain the phenomenon with greater advantage, I propose, in few words, to narrate an illustrative case.

Margaret A., aged 36, married at the age of 16, and now mother of nine children, consulted me lately at the New Town Dispensary. She complained of palpitation, with swelling of the legs and feet towards evening; she had but little appetite, and suffered from menorrhagia and leucorrhoea. There was no history of rheumatism nor of other antecedent malady, and the family history was good.

The patient's face was extremely pale, and the conjunctivæ, lips, gums, and tongue, were blanched in the highest degree. No impulse was visible in the precordial region, and there was no swelling or oscillation of the cervical veins. The apex-beat occupied the fifth intercostal space, two inches from the mid sternum. In the mitral area a loud blowing systolic murmur was heard, and there was an independent systolic murmur in the tricuspid area. Over the left auricle, the auricular murmur of Balfour was very distinct. A loud *bruit de diable* was audible over the jugular veins. It had a systolic augmentation of intensity, and, on the application of greater pressure, was easily converted into a distinctly musical note.

This is an ordinary clinical picture of anæmia in an advanced stage, such as affords probability of the presence of the cephalic murmur. On auscultation of the cranium, the murmur could be determined in three positions. When the stethoscope was applied to the closed eyelid, a low murmur was easily distinguishable. In rhythm it was somewhat later than the apex-beat, and slightly followed the carotid pulse. It was accompanied by the dull continuous rumble caused by the muscular contraction of the orbicularis palpebrarum in its closed state, by the irregularly intermittent noise produced by the sympathetic movement of the eyelid when the opposite lid winked, and by the respiratory murmur propagated through the cranial bones. These three acoustic phenomena are pointed out by Tripier as likely to mislead the unwary observer. The continuous muscular sound cannot be got rid of, but the irregular noise of winking can be stopped by placing a finger upon the opposite eyelid, and the respiratory murmur necessarily comes to an end when the breath is held. When the stethoscope was applied over that part of the occiput corresponding to the torcular Herophili, a systolic murmur was also heard, but less distinctly than that in the orbital region; and, lastly, on auscultation over the mastoid prominence a very faint murmur of systolic rhythm could be made out. No murmur could be detected over any other part of the head. The murmur was not perceptibly influenced by change of posture, but slight pressure on the carotid arteries diminished its intensity, and forcible compression of these vessels entirely abolished it.

Such is the usual condition, according to my experience, when the anæmia is tolerably well marked. In all cases the murmur is most distinct in the orbital region; in the other situations it is comparatively faint. My students at the dispensary can always hear the former with ease, but the latter can only be detected by those of them who have undergone considerable training in auscultation.

In cases of anæmia, it is not uncommon to find a continuous murmur

over the part corresponding to the torcular Herophili; sometimes this murmur, like the venous hum in the neck, presents a systolic accentuation. Since reading Tripier's earlier paper, I have not been able to determine the presence of this continuous hum over the occiput, and have only observed the faint systolic murmur as in the case above recorded. It is only in very severe cases that the occipital murmur is continuous.

If the murmur originated in the terminal parts of the internal carotid system, it should be found to wane in intensity with distance from that system. It is not so, however; as above remarked, the occipital is usually more distinct than the mastoid murmur.

The position of the greatest intensity of the murmur is of great importance. It is most clearly heard over the orbit, the mastoid eminence, and the occipital protuberance. This fact furnishes a key to the question. These three situations are closely related with the cavernous sinus, the torcular Herophili, and the lateral sinus; and I am of opinion that the murmur is produced by fluid veins within these sinuses: in other words, the murmur is of venous origin. It will at once be said that the murmur ought to be continuous, like the *bruit de diable*, if it arise from vibrations of the fluid contents of these venous channels. But, as in the case narrated, the venous hum is frequently found to have systolic augmentations of intensity. These are caused by the pressure of the large arteries upon the venous trunks, during the distension of the arterial walls, consequent upon the cardiac systole. This pressure creates additional waves in the contents of the veins, and the acoustic expression of these waves is increased intensity of sound. The internal carotid artery is in very intimate relationship with the contents of the cavernous sinus, being practically surrounded by the venous blood. When the anæmic condition is present, therefore, with its predisposition to the generation of intravenous ripples, the pulsations of the artery excite fluid veins in the blood contained within the sinus. In this, I think, we have a sufficient cause for the production of the orbital murmur. And similarly we may account for the occipital and mastoid murmurs. The internal jugular vein, at its origin and in its upper part, is so closely connected with the internal carotid artery, that the shock of the arterial pulsation is always communicated to it. Hence, in the anæmic state, fluid waves are transmitted upwards to the blood within the cranial sinuses, and cause a murmur in situations where the vibrations come to a focus.

It may pertinently be asked, Why is the murmur louder over the occiput than in the mastoid region? And why is it more distinctly heard over the eyeball than in either of these positions? The answer is not difficult to find. The structures lying between the cavernous sinus and the closed eyelid are of somewhat similar density, or to put the fact in different language, there is a continuity of soft tissues from the cavernous sinus, where the sound is generated, to the surface of the globe of the eye, where it is perceived. On the other hand, a murmur arising within the torcular Herophili must cause vibrations in the osseous structure of the occiput, in order to give acoustic manifestations. Physical laws tell us that sound is better transmitted through media of similar density, than where it is propagated through media whose density differs considerably. This is the reason why the orbital or cavernous murmur is more distinct than the occipital. And in the same way the murmur arising at the bend of the lateral sinus has to pass through the temporal bone; but this is broken up by the mastoid cells containing air, so that

there is a physical reason for the greater weakness of the vibrations in this position. From the occurrence of a continuous hum over the torcular Herophili, we should expect to find a similar murmur over the orbit and mastoid region. That there are continuous vibrations, I most firmly believe ; but, except in cases of profound anæmia, these are too feeble to reach the ear, and only the systolic augmentation of the sound is heard. Further observations will probably prove that there is a continuous hum in very severe cases.

As regards the place occupied by the cephalic murmur, in the order of development of the physical signs of anæmia, it may be remarked that it is the latest to appear. As far as my experience goes, the following is the sequence of phenomena : venous hum over the cervical veins ; accentuation of the second sound in the pulmonary area ; systolic murmur over the left auricle, with impurity of the first sound at the apex ; systolic murmur in the mitral and tricuspid areas ; and, lastly, cephalic murmur.



