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Observation on the Graphic Records of the Accentuated Second Sound in Various Conditions and the Diastolic Murmur in Aortic Insufficiency.

By

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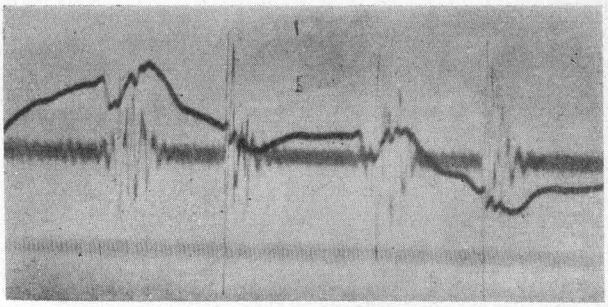
The features of the second sound undergo variations according to the blood pressure and the properties of the semilunar valves and their vicinity.

A) The accentuation of the second heart sound.

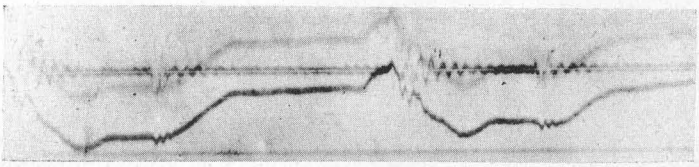
This is a significant phenomenon in auscultation, perceived in most cases of hypertension and the infiltrative affection of the lungs. In those cases, the aortic or the pulmonary sound is intensified and shows a varied tone characters differing from the normal.

The graphic record of the accentuated sound also showed a varied appearance corresponding to the auscultatory phenomenon.

(A)



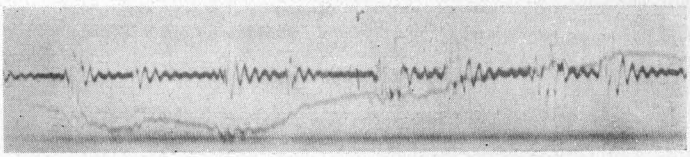
(B)



The records shonwn here illustrate the various features of the accentuated second sounds. The most marked change was observed in the principal part. In all cases, the duration of the principal part was longer than normal and it was found by measurement to be about 0.03—0.07 sec., while the principal part of the normal sound does not last

more than 0.03 sec. In record A, the principal part is distinguished by a prominent amplitude of remarkable magnitude. At the same time, the frequency of the vibrations in this part is far more rapid than normal and it was found to be about 125−150 hertz. But in record B, the amplitude of the principal part is rather small as compared with the following final part, and only tolerably rapid vibration of the principal part was observed. In spite of such considerable variations in the principal part, the final part did not show any particular change either in its form or in its duration.

(C)



Record C shows a very interesting case of the accentuation of the second pulmonary sound in pulmonary infiltration. In this case, on auscultation the tone quality and the intensity of the second pulmonary sound were found to change successively in each heart beat according to the phase of the respiration. The second sound showed a slight accentuation in the exspiration phase, but the grade of the accentuation was increased during the inspiration phase and at the end of the inspiration the second sound was heard reduplicated. In the record, such successive changes in auscultation were shown very well. The second sound in the first cycle of the record corresponding to the exspiration phase, showed almost the normal appearance. But the duration of the principal part in the following cycles was increased successively, and in the fourth cycle the principal part was divided clearly into two sections. The duration of the principal part in the first cycle was about 0.015 sec. The interval between these two sections of the principal part in the fourth cycle however, reached the considerable value of 0.05 sec. The appearance of the final part did not change markedly, and the total duration of the second sound was therefore almost constant ; it was about 0.24 sec. The duration of the systole— the interval between the commencement of the apex beat and the second sound— was also almost constant and it was about 0.24 sec. The second sound occurred exactly at the same time as the incisura of the apex beat.

Hence, the elongated part of the principal part of the second pulmonary sound in the inspiration phase must be attributed to its delayed occurrence behind the second aortic sound.

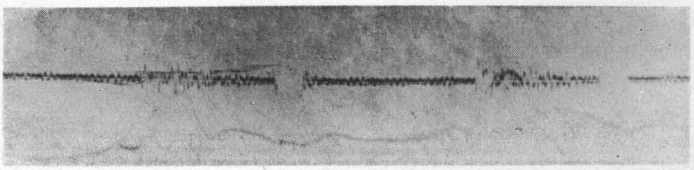
This agrees with the theory of the previous authors that the reduplication of the second sound in pulmonary infiltration is to be attributed to its being retarded behind the second aortic sound.

In short, the accentuation of the second sound was shown in the

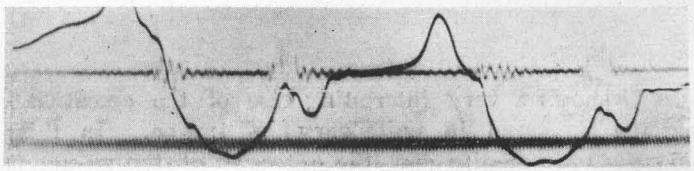
record by the varied appearance of the principal part, the prominence of the amplitude, the rapid frequency of the vibrations and the long duration of them. These three characteristics were observed all at the same time in some cases, and in others, seperately.

B) The diastolic murmur in aortic insufficiency.

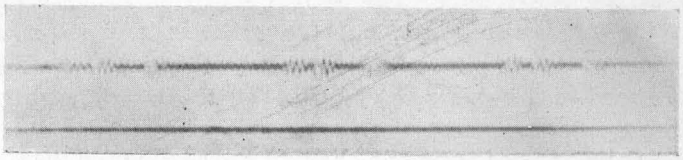
(D)



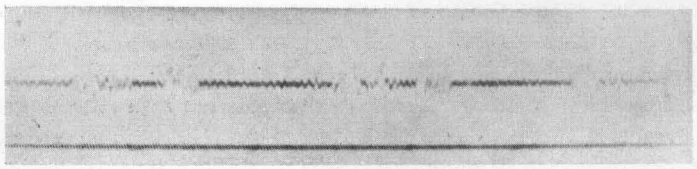
(E)



(F)



(G)



Unlike the case of the accentuation of the second sound, the normal features of the principal and the final part of the second sound were lost almost entirely in aortic insufficiency. As shown in the records, D and and E, the normal second sound was not found in any case, but the rapid vibrations of the murmur appeared in place of the second sound. The duration of the murmur showed remarkable variations and not seldom the vibrations of the murmur occupied the whole diastole. The frequency of these vibrations vas 125—150 hertz, and they showed in some cases a decrescendo and in other cases a crescendo.

It is significant that these vibrations of the murmur were always preceded by relatively slow vibrations of small amplitude, which had a similar appearance to the principal part of the second sound.

It is impossible, however to decide immediately that these vibrations are the principal part of the second aortic sound, because, as is shown in the records, F and G in the figure, which were obtained from the aortic and the pulmonary orifice respectively, the diastolic murmur in the aortic orifice had not those vibrations, while, in the record obtained from the pulmonary orifice, the vibrations in question appear about 0.04 sec. earlier than the murmur in the aortic orifice. The commencement of the murmur in the aortic orifice coincides with the incisura of the apex beat, so that those vibrations observed in the pulmonary sound must be considered as the component of the second pulmonary sound.

Such a considerable affection of the second sound in aortic insufficiency confirms the view that the semilunar valves play a great rôle in the production of the second sound.

The murmur appeared actually in place of the second, while the latter did not show any trace of its existence.

Bibliography.

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