い。之はかかる心臓にあつては、左心房の病的變化の爲、左心房の心對電量の増加及び興奮傳播に要する時間の延長が考えられるが、その最大の時期は右心房心對電量の最大の時期より遙かに遅くなる爲、兩心房の心對電量の時間的な重りは比較的淺く、從つて標準肢誘導心電圖のP波の解析による心對電量に大なる變化を認めないわけである。

4) 心對電方向量の持續時間は相當程度延長している。右心房が健常な際は、P波の解析により知られる心對電方向量の終る時期は、左心房の興奮傳達が終る時期と一致するものであり、然してかかる病的左心房に於いては、之が相當程度遅延するによる故である。

5) 以上の特徴は竝に僧帽瓣口狹窄症の際のみならず一般に左心房の肥大及び擴張の際にも同様に考えられるものであるから、著者は、高安が左心房優勢なる語を提唱するのに同意したいと思う。

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Experimental Arteriosclerosis in the Lungs, especially on Research by Reconstructing Model. Part I. Adrenalin-Arteriosclerosis.

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Preface

The cause of arteriosclerosis, of course, is complicated and divergent, but many scholars agree that local elements of the blood vessels play a great part for causing arteriosclerosis. Therefore on the research for the arteriosclerosis, its stereobobservation seems very important to investigate the true nature of its attack.

We notice that some researches were made so far on the arteriosclerosis of central artery system, basing on such a stereo-standpoint, but I have never met with such research work on the arteriosclerosis in the lungs.

So I researched the arteriosclerosis in the lungs based on stereo-standpoint, as a partial research of "Experimental Researches on Arteriosclerosis", that is the main theme of our institute in these years.

In the 1st part, I have observed by reconstructing model on the pulmonary arteries of the rabbits that had been injected adrenalin, and this adrenalin-method was discovered by Josué (1903).

Materials and Methods

The materials which I have employed, were the same as Dr. Teraï's, a senior of our institute. He used them in his research on "Abnormal Function of the Male Sexual Organ and Experimental Arterio-

sclerosis".

I picked out No. 41, 115 (both contrast) and 38, 1 (the testicles enucleated) among the rabbits that had been injected adrenalin to accelerate arteriosclerosis and also injected Enarmon or enucleated the testicles to compound abnormal function of the male sexual organ.

I fixed these lungs of the rabbits in formalin and made them into several hundred series of sections every 20 micron thickened after celloidin-embedding. Staining was of the usual process. And I made a some reconstructing models, delineating section by section. As occasion demanded wax-models were made.

And the pulmonary arteries that I have observed, belong to the smaller group.

Results

I am going to state the results of this research:

1. Adrenalin-arteriosclerosis of various changes are observed on the pulmonary arteries of the rabbits by continual injections of adrenalin. Namely, there are muscular thickening of the media, thickening, degeneration etc. of the intima. The adventitia does not seem to react on arteriosclerotic changes throughout the course of the blood vessels.

2. The local relations of the occurrence and progression of the adrenalin-arteriosclerosis seem to

be almost ruled by a regular fundamental principle. Concretely, they are as follows:

a. Sclerotic changes are generally appeared powerfully on the side of convex surface of the blood vessel's curvature.

b. On bifurcating parts, we can generally see more powerful sclerotic changes than the other parts.

In stating in detail, sclerotic changes begin to occur from lower on the inside thigh of bifurcating parts, farther the distance to bifurcating parts is, more powerful they are, and they become just on the bifurcating part most powerful, and generally disappear soon after completion of bifurcation. And sclerotic changes usually occur more powerfully upon the upper and lower parts of the inside thigh of the bigger bifurcating branch.

3. A considerable large number of aneurysms

can be seen in places. The rate of their occurrences does not always agree with the degree of arteri-

Fig. 1 Thickening of the intima on the inside thigh of bifurcating branch.

Fig. 2 Schema of miliary aneurysm on bifurcating part.

Fig. 3 A. B. C. D.: Miliary aneurysm on bifurcating part.

osclerosis. Especially I have observed that most of them had been formed on the excapillary arteries almost on the whole parts. And such aneurysms are almost formed on bifurcating parts as their central points: namely, on one side it is spreading on to both branches, appearing immediately before bifurcation, on the other side it is spreading only on one side of the branch, appearing before bifurcation. So it can be seen that their localizations are irregular.

Discussion

We see some minute researches our pioneers had made on the fact and its genesis of some kinds of changes, specially arteriosclerotic changes which had been occurred on the pulmonary arteries of the rabbits by the continual injections of adrenalin (*Kiyono and Higashihara, Shin, Haga, Suzue and Okamura, Fujisaki, Shinohara*).

But we do not hear such a research as the one I have made recently, observing the relation between the local elements of the blood vessels and the occurrence or progress of adrenalin-arteriosclerosis.

Indeed we hear about some researches here and there concerning this disease of the central artery system and some organ's arteries, basing on stereosandpoint (*Thoma, Anitschkow, Kodama, Tanaka*).

Surveying the researches by these scholars, it will be noticed that there is a common rule naturally. That is, the occurrence and progress of arteriosclerotic changes which are controlled by stereo-local structure of the blood vessels themselves.

Concretely arteriosclerosis is noticed to occur and progress on curving parts and bifurcating parts of the blood vessels. The result that I have obtained in this research for experimental arteriosclerosis in the lungs tallies with the researches as above mentioned also. In my case,adrenalin-arteriosclerosis in the rabbit's lungs sclerotic changes are observed to occur powerfully on the convex surface of the curvature or bifurcating parts (specially on bigger branch) of the blood vessels. We may naturally assent to this fact by common sense, and it will be understood that sclerotic changes would begin to occur on the parts, having collisions of blood stream most powerfully.

In the followings, the aneurysm which research is most interesting and suggestionable will be discussed.

Well, according to the books of medicine, adre-

naline has the action, dilating the pulmonary artery (of rabbit in my case). Looking over many literary works, we could see clearly that the affecting parts lied on the peripheral arteries (*Takashima, Ito, Takino and Isukawa, Tanaka*). But about the genesis of this dilating action, they have not the established theory, saying primary or secondary. Just at this time, I have accidentally discovered the occurrence of aneurysms as a byproduct while making the research work of arteriosclerosis. And their localizations are on the excapillary arteries and the arteries smaller than medium sized, moreover the centers of these aneurysms are almost on bifurcating parts of the blood vessels.

Hitherto I have never heard any one had succeeded in creating aneurysm experimentally in the rabbit's lungs.

Anyway it is natural for me to deduce that there will be some relations between the facts in the literature as above mentioned and my aneurysm.

Then I should like to understand that the occurrence of this aneurysm would be depended on collapse of the peripheral arteries, because perhaps they couldn't continue their changeable dilatation for continual hypertension, according to adrenalin-injecting.

Considering reversely, this dilatation of the peripheral arteries might be considered adaptation for the regulation of blood pressure.

The knowledge that I have acquired from the aneurysms that I accidentally discovered recently which are formed in arteriosclerotic lungs of rabbit, will give suggestions on the morphological study for function of the pulmonary artery in future, I believe.

Conclusion

The following is the conclusion as the result of my discussion about this research as above mentioned.

1. Adrenalin-arteriosclerosis in various degrees are caused on the pulmonary arteries of the rabbits by means of continual adrenalin-injection. Namely, there are thickening of the media, tickening, and degeneration etc. of the intima. But the adventitias did not indicate clear reaction for arteriosclerotic changes throughout the course of the blood vessels.

2. The occurrence and progress of adrenalin-arteriosclerosis are controlled under the stereo-local elements of the blood vessels themselves. In other

words, that will occur on the parts of the blood vessels, receiving greatly dynamic effects of blood stream. Concretely that will occur on the following parts:

a. On the side of convex surface of the blood vessels, the greater the curving the more powerful is the disease.

b. On bifurcating part generally occurs sclerotic change more powerfully. In stating minutely, adrenalin-arteriosclerosis occurs on lower from the inside thigh of branch before bifurcating part the farther the distance to the point of bifurcation, the more powerful is its occurrence. becomes most powerful just on the point of bifurcation and generally disappears soon after the completion of bifurcation. And this arteriosclerosis occurs more powerfully on the inside thigh of the bigger bifurcating branch.

3. There is a tendency that a large number of aneurysms are caused on the rabbit's pulmonary arteries by means of the continual adrenalin-injection. Their localizations are on the arteries smaller than medium sized and the rate of the occurrence do not always consist with the degree of arteriosclerotic changes.

At laying down my pen, I express my gratitude to Prof. Suzue, my teacher

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肺臓に於ける實驗的動脈硬化症特に象形複成模型による立體的的研究

第1編 アドレナリン動脈硬化症に就て

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動脈硬化症の發症に對し血管の局所要約が極めて重大なる役割を演ずるものなることは學者の等しく認めるところである。即ち立體的觀察の重要な所以である。余は我が教室に於ける年來の主要研究題目たる「動脈硬化症の實驗的研究」の一端として從來この方面の文献乏しき肺臓に於ける動脈硬化症を立體的に研究し第一編としてアドレナリン處置群に於ける論説を進めたのである。即ち動脈硬化症催發處置としてアドレナリン連續注射を施行せる家兎肺臓に就き之を象形複成模型として觀察し凡そ次の如き事實を明らかにした。

1. アドレナリン連續注射を施行せる家兎肺臓動脈は種々の程度のアドレナリン型硬變性變化を惹起する。即ち中膜の筋性肥厚。内膜の肥厚。變性それである。但し外膜は全經過を通じて概して硬變性變化に對し著しい反應を示さないようである。

2. アドレナリン型硬變性變化の發現増強は常に血管自

體の立體的局所要約に支配される。換言すれば血流による力學的影響の甚大なる部位に發現する。具體的に言えば

イ. 血管彎曲部凸面側而も概して屈曲度強き部位程強く發現する。

ロ. 血管分岐點に於ては常により強く發現する。之を詳言すれば。

アドレナリン型硬變性變化は分岐點前分岐脚内股側下方(分岐點迄の距離は硬變度強き程遠い)より次第に分岐點内股側に及び分岐完了すれば概して直に消失する。而して分岐大分枝の内股側により強く發現するのを通例とする。

3. アドレナリン連續注射により家兎肺臓動脈管には動脈瘤が多發する傾向がある。その部位は主として中等大以下の細小動脈で、その發生率と硬變度とは必しも平行しない。