Alexr Mc Donald

M & N

Mr Alexr Mc Donald

read with a fair amount of success but scarcely so clear in treatment as to leave an entirely satisfactory impression

Etiology of Pulmonary Hemorrhage-

To Professor Henderson-

Haemorrhage as was shown by M. Andral may take place under three different conditions- Firstly, it may be produced when there is any obstacle to the circulation, any obstacle to the free return of blood from the capillaries to the central organ of the circulation; and this is a way in which, as we shall subsequently see, it very frequently does occur. Secondly, when there is a state ~~of active~~ of active or sthenic hyperaemia This also is a condition under which pulmonary haemorrhage very frequently occurs: and it may be perfectly consistent with a state of good health The third and last is that of asthenic or passive hyperaemia - a state which is accounted for by supposing that the capillary vessels have lost their inherent elasticity, in virtue of which they evacuate themselves of their contents; and consequently that they have become inordinately engorged with blood; - in a word that they have lost their tonicity-

I think it may be more concisely put if we divide the haemorrhage as most writers on the subject do, into symptomatic haemorrhage, and idiopathic haemorrhage. The former embraces the first cause of haemorrhage of M Andral - Obstruction to the return

of blood to the heart. the latter comprising his sthenic and asthenic hyperaemiae. In both these forms there precedes the bleeding a condition of congestion of the parts concerned.

Idiopathic haemorrhage. then, may be active or sthenic, passive or asthenic; the disease affects a class of persons differing in the one case from those whom it affects in the other: and the consequences in both cases are likewise dissimilar. The active form occurs in young and robust individuals, who spend an indolent life and live fully; and in such cases it is to be regarded as the safety valve of the system. It occurs, with the effect of warding off a more serious ailment that might otherwise be impending - such for instance as cerebral apoplexy. The patient feels relieved by the amount of blood which he has lost. It is announced by a set of premonitory symptoms, and the blood is florid and coagulable.

The passive form, on the other hand, is not usually announced by a set of premonitory symptoms, and so far from its being a curative medium in the hands of the Great Physician, the patient is rendered very much weaker by it.

The bleeding has little tendency to stop of itself. The aged, and persons of middle age, more especially those of dissipated habits, are most liable to become the victims of this form of hemorrhage. It also occurs in the feeble, and in persons debilitated by disease. The blood is said to be dark and not very disposed to coagulate.

It may be worth remarking, in passing, that the active form of idiopathic congestion, has, in some instances, another mode of termination, namely in the morbid process of inflammation. It is impossible for us at present to explain why it should have the one termination, at one time and at others the other; but the fact, nevertheless, is well known.

There is yet another form in which, it is said, haemorrhage may arise, and which does not find a place in the division which we have made. The cause of this, it is said, is not any morbid condition of the bloodvessels, nor any interruption to the return of blood to the heart. The determining cause is to be found in the consistence of the blood itself. It is said that, in the condition of spanaemia, or when the blood is chemically

altered it is liable to permeate the blood vessels. This condition I can believe to be capable of giving rise to dropsy or anasarca. but I am at a great loss to understand how haemorrhage could result from it. I am pretty satisfied that this condition of spanaemia is not alone capable of producing true dropsy. This opinion I have formed from a case that I had the opportunity of seeing for a time, in which case the blood was hydraemic. I should think, to the last degree consistent with life. To the naked eye the blood had the appearance of pink fluid, and the corpuscles were so scarce and misshapen that, examining with the microscope, I should have experienced considerable difficulty to make out what the fluid really was. if I had not been aware. Yet in this case there was neither haemorrhage nor dropsy.

I think, then, that the division which was made into Idiopathic & Symptomatic ~~haemm~~ embraces all the forms in which pulmonary haemorrhage may arise.

Haemorrhage in the lungs may arise from two different sources, for there are two sets of vessels connecting them with the central organ of the

circulation - The pulmonary artery which arises from the right side of the heart and conveys venous blood to the respiratory organs, and the bronchial arteries which arise from the aorta or intercostal arteries. A set of veins drain the blood sent by each of these sources. So intimate is the relation subsisting between them in their ultimate branches, as we shall subsequently see, that when one vessel is affected by the causes likely to give rise to haemorrhage, the other is liable to participate. Supposing that an excited state of the circulation exists in the pulmonary artery, from any cause the blood will be driven into the capillary vessels of this system and give rise to a state of haemorrhagic engorgement, and the effects of it may even extend to the other arterial system, and give rise to such an amount of engorgement of the capillary vessels of the bronchial tubes as may cause — haemorrhage in them. Conversely, the bronchial system may be that ~~whose~~ which the action is excited and the blood passing from them into the capillary vessels spread upon the mucous membrane of the bronchial tubes may cause haemorrhage to take place into their interior

How is this haemorrhage brought about? It is the common belief of the unprofessional public, who are always alarmed at the sight of a profuse flow of blood from any internal organ,- as indeed there is but too frequently cause for alarm on the part of the physician himself if he be possess-ed of the common instincts of our humanity, and is anxious for his patient's welfare,- I say it is the common belief that under these circumstances the unhappy sufferer has sust-ained some severe internal lesion. So common, indeed, is this opinion that the phrase "he has burst a blood vessel" or "has broken a blood vessel" passes from the lips of most people on seeing an individual so conditioned as I have indicated. We will now shortly consider how far this opinion is justified by ascertained facts. Is it the case that ruptures of this kind do take place in the lungs? Is the vulgar pathology of pulmonary haemorrhage also the correct pathology of that condition, or is there any other way in which we can satisfactorily explain it? Most certainly this is the way in which the most common form of pulmonary haemorrhage occurs. Doubtless openings do take place also into the

larger bloodvessels by the progress of ulceration just as such a process is seen in other situations. In ulceration of the stomach affecting the posterior and upper walls it is laid down in books as a possible contingency that the ulceration may happen in extending itself to open into the splenic artery as it courses along the posterior wall, or into the coronary artery or some of its branches which run along the upper wall; and cases illustrating these accidents are recorded. The same thing occurs sometimes during the process of softening of crude tubercles in the lungs - where a portion of the lung has been broken down by inflammatory ulceration and a cavern results - Under these circumstances there is, occasionally, evidence that bleeding has taken place from an open vessel of pretty large size. The ulceration may extend from neighbouring tissues and open into the walls of the vessel itself - these are rare occurrences in the lungs - Pulmonary hemorrhage due to the giving way of a large vessel is extremely rare - although in other organs as the Brain it is not so uncommon. The reason of this difference in the two organs is to be found in the fact that degeneration of the coats of the Pulmonary vessels is so very rarely seen -

It is not a difficult matter to explain why — haemorrhage from the formation of a vomica or from the progress of ulceration affecting the coats of bloodvessels themselves should be a rare occurrence. At all events a neat theory has been constructed to account for the fact. From the nature of the fluid they contain, it is supposed, and I have no doubt correctly, that if from any cause the circulation in them be interfered with, and the blood brought to a state of stagnation, that fluid will coagulate and effectually seal them up, so that there is no danger of haemorrhage, should the vessel break down with the infiltrated lung, or, in the other case, should the wall of the vessel be affected with ulceration. It is said that the tubercular matter as it collects presses upon the bloodvessels, and having caused coagulation of their contents they become obliterated to a distance from the place of the obstacle, and sealed up as effectually as if a ligature had been applied.

Such I believe to be the only causes in operation in producing haemorrhage from the larger bloodvessels in the lungs; and I shall now glance at the other and more common form — namely, where it is the

capillary vessels that are involved. I may remark that it is perhaps a fortunate circumstance that pulmonary haemorrhage is more frequent from the smaller than from the larger bloodvessels. The command of the former is much more within our reach than is that of the latter. There are many cases of capillary haemorrhage in which a cure for the time being has been accomplished; whereas, I should think. bleeding from any vessel of large or considerable size is necessarily beyond our reach -
It used formerly to be taught and received that haemorrhage from the capillary vessels takes place by a process of exhalation, as it was called. It was maintained that the blood and blood globules passed through the delicate walls of the bloodvessels without there having occurred any lesion. It was supposed that the walls became relaxed and that the minute pores through which, it was said, nutrition was carried on became larger and allowed the blood and globules to pass through by a process of transfusion. The doctrine did not stand here, however, for evidence was brought forward in its support and it was held that on careful scrutiny of the parts from which, during life, blood had escaped

no abrasion could be discovered. If this were correct it would undoubtedly give to the hypothesis, at all events, some ground to stand upon, for physical evidence must be considered a most important element in the reckoning. What are the circumstances of the case? In the first place we must suppose that openings so large as to admit the passage of so large bodies as blood corpuscles cannot escape detection, if they exist, by the microscope. These hypothetical orifices, then, have never yet been seen. We are not left here, however, to make the next best speculation. The microscope has in this as in most instances in which its services have been appreciated definitely settled the question. It has found out what, according to supporters of the transfusion theory, did not exist because they could not see it with the naked eye — namely a congeries of broken and distended capillaries from which the blood had escaped. Moreover, in cases of obstruction to the return of the venous blood in a part we have a condition favourable for this transfusion, although we usually see that it does not occur, but that serum is more liable to be exuded and constitute a state of edema or anasarca.

I alluded before to the opinion that haemorrhages may occur when the blood is spanemic, or altered in its chemical constitution. The watery part of the fluid containing, it may be, some of the colouring matter of the blood may transude under such circumstances and give rise to the appearance of a hemorrhage; but it is impossible for the blood globules to pass out without there having occurred a rupture of the capillary walls- The circumstance of the passage of a watery fluid tinged with colouring matter is as much and no more a hemorrhage, as if the serum without having any colouring matter had transuded; for what we consider to be the result of haemorrhage must consist of all the constituents of blood together in mass. The supposition that haemorrhage can occur without the rupture of bloodvessels appears so absurd, that the mere enunciation of it, seems to involve a very contradiction

These I consider to be all the causes involved in the production of pulmonary haemorrhage. How they are called into play and in what diseases will be entered into more fully in a subsequent part of this essay

Omits all states of the blood connected with these

Before going further I may here state what I omitted in the proper place - namely - that when I say haemorrhages from the large vessels of the lungs are very uncommon I do not mean to include the case of aortic aneurisms. These are not very uncommon: but they do not properly come within the range of my essay - Aneurisms often enough discharge themselves through the air passages when they burst: but these occurrences are totally distinct from pulmonary hemorrhage

We shall divide hemorrhage from the lungs into two parts, which shall have reference to the sources from which the blood proceeds - namely hemorrhage from the vesicular structure and haemorrhage from the bronchial tubes - I make this distinction - not arbitrarily, but because I think it is proper they should be separated. There is certainly good anatomical reason for our consid-ering them under distinct heads - We shall see that the bronchial mucous membrane is not sup-plied by a continuation of the capillaries which nourish the vesicular structure; but has a set of arteries provided for its own nutrition. And we shall also see that there are certain agencies

in operation to produce bronchial haemorrhage that are not engaged in producing that from the vesicular structure

In order to understand more clearly how hemorrhage from the causes indicated above is brought about to understand, as it were, the mechanism of it it will be convenient to allude very briefly to a few points connected with the circulation in the lungs.

I mentioned before that there are two sets of arteries arranged for this circulation – the pulmonary or functional and the bronchial or nutrient arteries. and that there are two sets of veins for draining the blood from the capillaries of these sources and carrying it back to the central organ of the circulation. The pulmonary arteries having arrived at the root of their respective lung divide into branches corresponding in number with the number of lobes in the lung,- the right consequently has three and the left two branches. These plunge into the substance of the lung, maintaining a regular method of distribution. They pass on in company with the bronchial tubes, without forming collateral anastomoses in their course, having gained sufficient

tenuity they end in a network of capillary vessels. which is spread out on the walls of the most delicate and smallest of the bronchial tubes, and on the air cells – the small artery of each lobule maintaining its independency. This capillary network is spread out beneath the delicate mucous membrane of the air cells and smaller tubes. which latter having attained such a state of extreme tenuity probably serve the same function as the vesicles. to which they give rise The pulmonary veins arise from this plexus. but besides draining the blood from ~~from~~ the capillary plexus on the smallest non-cylindrical air tubes and air cells it is at present supposed by most anatomists that they are the channels by which the blood sent by the bronchial arteries to the smallest of the bronchial tubes which have not yet lost their cylindrical form, is carried back to the heart. These veins have no valves like those of other parts. They for the most part accompany the bronchial tubes, forming numerous latiral communications and joining to form larger vessels, till ultimately veins, arteries and bronchial tubes pass together to the root of the lung. The veins at the root of the lung have united into two large branches. which pass on

to the heart.

The bronchial arteries are distributed to the walls of the air tubes, &c. The capillary plexus which they form is partly drained by the bronchial veins which eventually unite to form a single trunk that emerges from the root of its lung. As I said above the bronchial veins do not take any rootlets from the plexus upon the smaller cylindrical bronchial tubes: in that situation the capillaries join those of the pulmonary vessels - it is supposed the arteries, and the blood is carried away by the pulmonary veins.

Slight attacks of pulmonary hemorrhage may occur as an accident in various diseases: but I would not meet the scope of this paper were I to enter into all these. I shall only mention those causes which are acknowledged to give rise to it; and dwell more especially on those upon which it most frequently depends - These latter may be embraced within very small compass, but they are sure in their operation - I think it may fairly be said - given a case of pulmonary hemorrhage, it depends upon one or other of two states: either the morbid condition that has

gwin rise to it has its seat in the lungs and is due to the deposit of tubercular matter in them: or it is situated in the heart and is the result of valvular disease of some kind or other- There is, however, another element which we must not overlook, for it occurs with sufficient frequency to merit a prominent position in our reckoning. Should we leave it out of our calculations we should often make very sweeping mistakes- When speaking of the prognosis of pulmonary hemorrhage I mentioned that sometimes it was not very unfavourable, and that the cases were those in which the lungs perform a vicarious function- If the patient be a female we must add to the two diseased states mentioned as probable causes of bleeding this one as being also a probable cause-

There are many causes which operate to produce or dispose to hemorrhage from these organs besides the ones mentioned; but they are less potently effective, and the result under their action is vastly less constantly produced- I shall merely state, without comment, a few of these-

All those circumstances which have the effect of producing congestion of the lungs operate in this way: Excessive action of the respiratory organs as in playing wind instruments— Excessive and long continued action of the organs of voice, as in public speaking or singing — Violent exercise. The abuse of spirituous liquors. Violent attacks of epilepsy or straining of any kind. Any circumstance that interferes with the free circulation of the blood in one or more organs or parts of the body; and which directs an inordinate amount of that fluid to the chest will have the same effect. Tumours of the abdomen: the gravid uterus; or the collection of a quantity of fluid in the cavity of the peritoneum by exerting continued pressure upon the viscera of the ~~of the~~ abdominal cavity, direct a quantity of blood away from it, and it is sent in undue proportion to other organs. Wounds of the chest. Certain acute disorders as Small Pox & Plague and the intermittent form of fever have all been cited as causes but they are not very important

Are there any predisposing causes? There are-

The nature of the membrane from which the blood proceeds may be said to predispose to it.= hemorrhages being much more common from mucous membranes than from any other tissue in the body. Malformation of the chest furnishes in those cases in which it exists. also a predisposition. In those instances in which there is less capacity of respiration than ordinary — the performance of it requiring greater effort and being accompanied by a minor degree of facility of breathing — as if there was not space enough to maintain equilibrium between the amount of blood sent to the lungs and the quantity of air present to act upon it. In those cases. I should think, a disposition to its occurrence exists. indeed one is almost compelled to seize upon this as a theory for explaining why the disease will only occur in one of two individuals affected with the same determining circumstances. I should think it at least important as a predisposing cause. Vicarious menstruation we have said is a common cause — among women. This discharge may occur from various organs; but occurs most frequently.

from the lungs, and at that period when had the discharge come away from the natural passages, the women had menstruated. When it has been again instituted by the proper channel the discharge from the unwonted organs ceases. Cases of this kind are recorded in which the women have menstruated by their lungs during a long life time- In some cases the bleeding from the lungs occurs antecedently to the period of onset of the menstrual discharge and disappears when it has been properly established It may exist simultaneously with the menstrual discharge which, in such a case, is deficient- the pulmonary discharge making up for the deficiency. Great distress is occasioned to the patient from the congestion which always precedes the hemorrhage- Laennec has supposed, with considerable plausibility, from the great loss of blood that sometimes takes place in certain deseases, and from the sudden advent of a general congestion- that the blood in the body becomes expanded- He refers, in support of this idea, to the fact that most people are affected with hemoptysis

who ascend to an altitude ~~sufficient~~ sufficient to diminish considerably the atmospheric pressure.

The cessation of the menstrual discharge is not the only instance, however, that gives rise to a vicarious bleeding. We have a similar instance in the stopping of a hemorrhoidal discharge. It is well known that an arrestment of this discharge will give rise to it; and the hemorrhage from this cause exhibits the same tendency to return as the discharge which it has substituted

I mentioned that the two most common of the causes of pulmonary hemorrhage are Phthisis and certain valvular diseases of the heart; and I shall now enter into a consideration of each of these potent agencies.

Pulmonary hemorrhage is much more frequently the result of Phthisis than of Cardiac Disease. According to statistics the proportion of cases of phthisis in which — at one period or another in the progress of the disease — there has been no haemoptysis is very small. In about five sixths of all the cases of Consumption

haemoptysis occurs. It is not so common as this in cardiac disease. there being many cases in which no hemoptysis has occured at any period. I shall first consider phthisis pulmonalis. It used to be a disputed question whether phth-isis really was the cause of haemoptysis; and whether it was not the case the pulmonary hemorrhage was the cause of Phthisis. The claims entitling each of these to be considered as the cause of the other have been ably maint a-ined by the best authorities; but at the present time professional opinion, I presume, inclines more to the view that it is phthisis that is the cause of the hemorrhage. Laennec upheld this view and maintains as an argument in his favour that hemorrhage from violence is unattended with any unpleasant sequelae if properly tre-ated. It is held again by Andral whose views on the subject are opposed to those of Laennec, that the subject in whom the hemorr-hage excists must have a predisposition to tubercle before the hemorrhage can give rise to it; but if the subject be predisposed to tubercle, these bodies may arise and multiply

rapidly in the midst of a part whose nutrition is modified in consequence of the circumstances under which it is situated. Laennec again maintains that if it were true that tubercles resulted from hemorrhage we should have hemorrhagic engorgement transformed into miliary tubercles. I should hesitate perhaps to express an opinion on the matter; but I think the opinion of Andral is not altogether void of foundation, or but a fanciful theory. The following is a case given by him and quoted by Dr Watson which, it must be admitted goes so far to prove his point. "A man ill of chronic peritonitis had been for nearly two months in La Charité and had never presented any symptom which had relation to the organs of respiration . . . . One evening for the first time he suffered some dyspnoea; and in the course of that night he spat up a large quantity of florid & frothy blood. For the five following days the haemoptysis continued abundant then it diminished by degrees and at length stopped. But the patient continued to cough & breathe with difficulty and at length he died.

In the right lung there were found several masses of a brownish red colour exactly circumscribed and constituting, in short, that condition to which Laennec gave the name pulmonary apoplexy. One of these masses contained a considerable number of granulations of a yellowish white colour and having all the characters of minute tubercles in an early state. Two others of the red masses contained each a very small number of these white granules; and in the remaining masses no tubercles at all could be discovered, nor was there any trace of them in other parts of the lungs; but they were numerous in the false membranes of the peritoneum." Of course it can't be held that in this case the tubercles caused the hemorrhage seeing that apoplectic masses existed in situations where there were no tubercles; while on the contrary it appears more consistent to consider the tubercles as springing up in the bloody masses. Much, however, can not be said of one case. We should have a number of such to entitle us to an opinion. Walshe from an examination of 106 cases draws the

facts that hemoptysis never appeared as the first symptom; but is only the first symptom noticed by the patient

Leaving the interesting question, whether tubercle is produced by pulmonary hemorrhage, which lies a little out of the way of the proper scope of this paper, we have next to consider the rationale of hemorrhage after tubercles have been deposited in the lungs – the method which is considered, at the present time, to be the one in which pulmonary hemorrhage arises-

Opinions vary as to the seat of the hemorrhage in these cases. Dr Watson thinks that most commonly it comes from the bronchial tubes, and that part of it passes backwards, during the violent efforts to respire, into the vesicular structure, and gives rise to the circumscribed form of pulmonary apoplexy. He mentions a case that was told to him by Dr Latham; that of a female labouring under phthisis who suffered from a severe attack of hemoptysis – such as caused death. "Her lungs were found riddled with tubercular cavities; and each of these contained a little clot of blood" He thinks it

more probable that the blood should have reached each of these by the larger bronchial tubes, by regurgitation, than that each cavity should have suffered from haemorrhage simultaneously- I believe this to be true, but at the same time it may be a question not resting entirely between these two alternatives- Hemorrhage may have arisen in one or more of the cavities, and from the efforts to respire, the blood oscillating in the smaller bronchial tubes may have filled each of the little cavities. It would certainly be a very remarkable coincidence were each of the little cavities the seat of an independent hemorrhage at the same moment- If, on the other hand, we look to the larger bronchi as the source of the bleeding, how are we to account for its occurrence there? There is not much probability, I should think, that it is due to congestion in these tubes produced by the presence of tubercle in the lung. We pointed out that the bronchial arteries distributed to the larger tubes were drained by the bronchial veins: and that only the capillaries in the smallest cylindrical, and the non-cylindrical tubes communicated with the pulmonary vessels. Consequently

the congestion leading to hemorrhage— although it is not maintained that it can not occur in the larger bronchi. where, being remote, the congestion will be less felt— must be much more intense in the lobular structure. and in the smallest of the bronchial tubes. The circulation through the larger bronchi is free; that in the vesicular structure and smaller of the bronchial tubes is obstructed owing to the presence of tubercle. the mass of blood is thrown back upon these latter vessels first; and secondarily upon the collateral circulation and the vessels of the larger bronchi. It is probable, therefore, that it is a mistake to suppose that the blood in a case of phthisis comes from the larger bronchi. Dr Watson formed his opinion principally, I presume, from a case of fatal hemorrhage from the lingual branch of the carotid artery, in which circumscribed patches of blood were found in the lungs. His conclusions with regard to it are perfectly legitimate; but if the anatomy of the pulmonary circulation be such as I have represented it, I conceive a difficulty in accounting by his theory, for many cases of pulmonary hemorrhage—

I have anticipated above what I am to say now.

that hemorrhage from the lungs is looked upon as depending upon congestion so excessive as to cause rupture of the capillary vessels. When tubercle becomes deposited in these organs to a considerable extent, the pulmonary circulation is interfered with. It becomes obstructed and this calls for increased power in the contraction of the propelling organ and as a consequence of this rupture of the capillary vessels and hemorrhage. The hemorrhage will be much more likely to occur if the tubercles have been rapidly deposited so as suddenly to divert the blood into collateral vessels.

The relations subsisting between the cardiac and pulmonary organs are of so intimate a nature that it will readily be seen how disease in the former must exercise an influence on the latter. It becomes a matter of great interest to examine the diseased actions produced in the one by modifications in the action of the other.

We pass to a consideration of the method in which pulmonary hemorrhage is produced by disease in the cardiac organs, and of the different lesions of that organ which produce that result.

First with reference to hypertrophy of the right ventricle as a determining cause. Opinion is divided as to the efficiency of this agency in producing pulmonary hemorrhage. It is maintained by some that that is one of the results of this condition. Others aver that such is by no means the case, but that it has a different effect altogether. Those who take the former view hold that it operates by causing an undue flow of blood to the lung and the consequent rupture of the capillaries giving rise to pulmonary apoplexy. Dr Stokes is of opinion that hypertrophy of the right ventricle is perfectly calculated to produce pulmonary hemorrhage. Walshe thinks it is not well established that such is the case. He has found pulmonary apoplexy accompanying hypertrophy of the right ventricle; but in these cases there was present also mitral regurgitation. Dr Watson thinks that this condition is not sufficient to account for hemorrhage. He thinks that any obstacle to the free passage of the blood in the right chambers of the heart would have the effect of engorging the liver and the vena portae and thus prevent the lungs from receiving

their due proportion of blood- No doubt this would be the effect if there were dilatation with hypertrophy The cardiac lesion with which most commonly of all, hemorrhage is associated, is lesion of the mitral valve- Of this there are two forms- namely mitral obstruction and mitral regurgitation With the former pulmonary apoplexy is more frequently found than with the latter- Notwithstanding that hemorrhage occurs more frequently with disease affecting this valve than with that impairing the function of any other. it is not by any means the case that it it will be found at one time or other in the subject of one or other lesion- There are very many instances that occur in which there never was any bleeding. When the mitral lesion is that of regurgitation the pulmonary veins into which the pulmonary and part of the bronchial arteries empty themselves are prevented from opening into the left auricle- They become congested and the effect of that congestion is felt by the arteries whose branches they drain- The stagnation of the blood thus produced throws increased work upon the heart. which labours to force the blood through

the pulmonary artery. The consequence of all this is that rupture of the capillaries is brought about and pulmonary apoplexy is produced. When the lesion is that of constriction the same phenomena are observed. The opening between the auricle and ventricle is narrowed, and the left auricle is never emptied of its contents. The pulmonary veins not finding space for their contents affect by their congestion the arteries just as that occurs in mitral regurgitation. There is still another form of valvular disease which occasionally determines pulmonary hemorrhage, and it seems to be a cause which is very much overlooked in books. I mean Aortic regurgitation. It is not so effective as mitral disease but it produces pulmonary hemorrhage with sufficient frequency to merit attention. There are cases on record of pulmonary hemorrhage arising from the compound cardiac lesion of mitral and semilunar aortic valves. Dr Law mentions one such, which is quoted by Dr Stokes in his book on diseases of the heart and aorta. It is not, however, to such a combination that I refer. During the

summer session of 1862. I had the opportunity of observing two cases of the kind I refer to. In the Royal Infirmary of this city. One occured in the person of a man the other in a woman, both advanced in life. Both of these cases were instances of Aortic regurgitation uncomplicated with mitral insufficiency as was made out by physical examination during life; and by post mortem examination the diagnosis was confirmed. In neither of these were there any traces of tubercle in the lungs. Both of them had profuse hemoptysis during life. the woman was also the subject of angina pectoris during the last few days. The lungs were found after death to be congested and deeply affected with pulmonary apoplexy. Since then I have met with another case, in a man of middle age, in my dispensary practice. I consider that the physical signs point to his case as being similar to that of the two above. This man has been labouring under palpitation much increased on exertion for a considerable period. and on one occasion spat up a considerable amount of blood. I could detect no physical sign of mitral disease. He has a loud diastolic murmur

loudest heard at the base. There are no signs of phthisis- He is a shoemaker to trade. and it is just possible that the bent position which he has to assume at work may have determined the hemorrhage-

The rationale of hemorrhage from this cause is very much the same as in mitral disease- The left ventricle becomes dilated from the recoil of the blood: and there is not a free passage of that fluid from the left auricle to the left ventricle. The pulmonary and the part of the bronchial artery that is distributed to the smaller bronchial tubes, are first congested- the rest of the bronchial arteries being secondarily affected- This congestion is still more increased by the action of the right ventricle and rupture accompanied by extravasation ultimately occurs. It is not necessary for me here to repeat the objections to the supposition that pulmonary hemorrhage most frequently comes from the larger bronchial tubes; and pulmonary apoplexy is only the accident of this- Suffice it to say, that what I said when treating of that subject, will apply, but with still more force to every form of cardiac lesion which I have enumerated among

the determining circumstances of pulmonary hemorrhage.

I shall complete in a few words the subject of hemorrhage from the bronchial tubes. This had so much importance in the eyes of Laennec that he devoted to its consideration a distinct chapter in his work on diseases of the chest. Others — however, from the attention they have paid to the subject have concluded that it is a very rare occurrence

Regarding the etiology of this affection, the remarks which were made when speaking of hemorrhage from the vesicular structure of the lung, equally apply to it. The same predisposing causes come into play in effecting bronchial as pulmonary hemorrhage; and likewise the same exciting causes. The only qualification necessary to be made with regard to the latter is one that has already been made — that all the causes determining hemorrhage from the lungs by mechanical emotion are, from the nature of the circulation in them, less potent in effecting it from the larger bronchial tubes, than from the vesicular structure and smaller of the bronchial tubes. Other exciting causes there are

however which perhaps do not occur often: but are sufficiently interesting and important to merit attention.

The most important is the presence of a membrane adhering to the inner surface of the bronchial tubes- the product of chronic inflammation of their lining membrane- It is simply an exudation from it resembling that formed from the trachea in an attack of croup- It is more albuminous than fibrous in character and never becomes organised- Some exudation cells have been found in it- It is formed chiefly in those of the bronchial tubes which are about the size of a goose quille- Stains of blood on the surface of these casts, and in their interior less frequently are sometimes seen: but hemorrhage is not a necessary accompaniment. Hemorrhage in chronic bronchitis, it may be observed is not a very rare occurence, for statistics tend to show that 24 per cent of cases of it observed at Brompton & University College Hospital, had bloody expectoration It may be that these casts are the exciting cause of it-

Generally for some time before the casts are expect-orated, the patient is troubled with difficulty of

of breathing and cough. Frequently attacks of hemoptysis supervene; the blood coming away in considerable gushes and for several days before the casts have been expectorated; but these symptoms cease so soon as the casts make their appearance. A theory explaining the production of the hemorrhage in such cases has been ingeniously by Dr Todd and it appears reconcilable enough with all the facts of the case. He supposes that a limited chronic bronchitis has occurred and that casts of the tubes are consequently formed. These after a time begin to separate, and in doing so cause a certain amount of hemorrhage which continues until the separation has been completed
Ulcers of the bronchial tubes will give rise to a less copious expectoration of blood, than is produced by the bronchial casts. It is held, however, that ulceration of the bronchi is not a common occurrence In phthisis ulceration of the trachea occurs in about 1 in 3 of all the cases according to Dr Louis' observation, and ulceration of the bronchi in about 1 in 14. He allows that it may occur more frequently in the latter than that for he did not examine carefully. I have no doubt this is true, but I have

never seen the bronchi examined in a post mortem section- Dr Hastings found in fatal cases of chronic bronchitis, occurring among the leather dressers of Worcester, that the mucous membrane was always ulcerated in the bronchial tubes- In phthisical ulceration of the trachea the posterior wall- the seat of the mucous follicles is very prone to be affected, and these glands very frequently ulcerate- doubtless from the deposit of tubercle in their interior. The contact of the tubercular matter, however, seems to be sufficient for the production of ulcers, for they are confined to those tubes which communicate with tubercular cavities, while those tubes communicating with crude tubercles are free from the affection

There I consider it to be the most important agencies engaged in bringing about bronchial hemorrhage-

FINIS.

Alexander McDonald-