The Pathology of Obstructed Circulation
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I thought the entire animal kingdom the presence of a circulation of nutritious fluid is now universally admitted by the most eminent Physiologists as to the proof of its universal presence in all living beings. It does not purpose here entering upon these, but it may seem remarkable that the very principle which in the time of Harvey was looked upon as an absurdity and for advocating which that distinguished Physician was treated with worse than contempt by his contemporaries, should be at this time accepted and relied on by every one as something entirely beyond the wish.
of contradiction, life do not know as yet all the circumstances, all the conditions which are essential to the maintenance of life: but we implicitly believe that the circulatory action of the blood and respiration, upon which this process in a great measure depends, are two of the most important—if not the most important of all. Indeed, when I speak of the circulation and respiration, it amounts to very much the same thing as if I were to say perfect accomplishment of the circulation. For the respiratory function is subservient to the circulatory one as much as if the blood is not properly aerated it is useless to the body and therefore ceases to pass through the capillaries not only of the pulmonary organs but also of the system in general. As soon as the blood has completely ceased to circulate throughout the body, we consider that death has taken place. For can it be supposed that life has ever been restored (unless miraculously) after both circulation and respiration had been completely stopped?
in the capillaries. If we take one part of the body in particular we shall find the same thing to hold good—namely, that as soon as blood has entirely ceased to circulate through its capillaries death takes place and the tissue is said to have mortified. We cannot explain facts of this kind; all we can do is to apply the experience which we derive from examination of them as well as we can.

Not only is a constant circulation essential to the maintenance of life but a vigorous circulation is especially requisite to a preservation of the frame from the various causes of disease which continually surround us. It matters a great deal how the causes of diminished vigour, in the circulation act upon the body: for either the quality of the blood may render this fluid less suitable for rapid transit through, or mechanical obstruction may delay the progress of its own with its quality is disreputable. In thefollowing

Sketch of obstructed circulation I purpose.
First of all to consider how mechanical obstruction to the return of venous blood from the various organs of the body comes to affect these organs; and then to take it to account the chief causes of such alteration in the physical properties of the blood as seem to prevent its easy transit through the capillary system.
Perhaps one of the best illustrations are

instances of the mode in which the circulation

of the blood may be retarded throughout

the whole body is one with an atrial

valve disease of the heart. In this instance

the obstruction appears to be of a purely

mechanical kind, and the effects of it

are as much so interesting and so suggestive

that I shall consider it by steps. The

process of inflammation which gives rise to

Rheumatic, before entering upon the detail

of this process a few words on the cause of

Rheumatic valve disease itself will not be out of place.

Acute articular Rheumatism is very often

borne pain by cardiac disease, and this

especially when very active measures have

been adopted for the treatment of the primary

affection. The occurrence of metastatic Rheu-

matism is to say, the sudden appearance of Rheumatic

Arthritis followed by the disappearance of

inflammation from the affected points, is

in general indicated by the superposition

of auricular, sometimes of a stenosis,
sometimess of a quick and muttering kind.
This Delirium was for a long time attributed to
diseases of the brain or of its membranes;
and Physicians used to say that the
disease had gone to the head — and it is
only of late years that this delirious or
delirious manner in a patient affected with
Pleurism has come to be regarded as
a sign of disease of the brain. It is well
known that Pleurism is one of those
Inflammations which we call 'specific',
from certain peculiarities presented by
them either in their progress or their final
course; and one remarkable characteristic
of Pleurism is that it is
ever, very rarely, giving rise to the formation
of Phlegm, but rather. And the very same
thing that is observed of this inflammation
when it affects the joints is also seen when
it attacks the membranes of the head.
Inflammation does not follow. I say, then
the whole I believe to be the rule. There
are exceptions or apparent exceptions,
need
It need not be wondered at, Rheumatic Carditis (which is the name applied to pericarditis and aortic carditis - both to affection of the substance of the heart) gives rise, thus, to the obstruction of lymph into the cavity of the pericardium, and also upon the valvular apparatus of the left ventricle of the heart. The lymph that forced rare into the pericardium, if left in any large quantity, solidifies, becomes organized and finally binds the two surfaces of that membrane firmly together. That which is caused upon the subcardium, or partly into the tissue between this and the muscular substance of the heart, is much pleasurable in the situation of the coronary tendinaceae and of the leaves of the mitral valve to which they are attached. By the organization of this lymph, the leaves of the mitral valve are gradually attracted in such a manner that they cease any longer to close efficiently the left auriculo-ventricular orifice. Even the shortening of the coronary tendinaceae themselves (which is almost certain to result from the...
The organization of the lymphatic vessels (as after them) would be insufficient to prevent the many instances in accurate closure of the mitral valve. Failure to dilate as those of which the cavity of the heart are composed can scarcely be altered in any degree without being in some measure incapacitated for performing their function. That the valves of the heart should become incompetent is therefore by no means as wonderful as that they should continue to serve their purpose at all. Nor may mention made as to the mitral valve only has been spoken of yet we frequently find the auricular valves of the aorta also incompetent from a circular evagination on or by the tip of which they are composed. Upon the one hand the endocardium should be affected more than another, why the left side of the heart should it always or almost always selected by this Rheumatic inflammation, which is that with an active process of morbid nutrition going on.
or with the heart continue to pulsate, the question aflow which it is unanswerable. Any more to later. The force which I wish to attend to is simply this, mark the catastrophic inflammation which takes place in the endocardium. Causing the formation of plastic lymphs and by the organization of this lymph, the valvular apparatus is primarily rendered incompetent for its purpose. Keeping in view that the leaves of the mitral valve open towards the cavity of the ventricle and that hole of the aortic valve open away from the cavity of the ventricle we make now be able to understand how incompetence of either valve may become the basis of involving the system in extensive and well-nigh incurable disease. Supposing these, mark the mitral valve alone is incompetent. Mark it to say unable accurately to close the left ventricle, aortic valve orifice. At every contraction of the heart a certain portion of the blood contained within the left ventricle
The ventricle is driven back upon the left auricle. The quantity of blood which regurgitated may not be very large; and indeed will depend upon the extent to which contraction of the vascular apparatus has been carried. But however small the amount, regurgitation does take place and the result of this is the immediate establishment of resistance to the return of blood from the lungs into the left auricle. The absence of this resistance may be trifling at first and such as we might be able to imagine would not interfere with the mechanism of the circulation generally and the respiratory functions particularly. Only a little impediment, however, and first to be of much consequence: and before proceeding any farther let us see what has already happened. The left auricle of the heart has become distended; its walls have yielded because they have been subjected to the hundred or pressure...
which they were wholly unprepared to meet. And how an effort is being
made to enable the auricle to carry on
its work. The muscular substance is
becoming more fully developed than
its usual to be. The lungs also are
suffering from delay in the transit
of blood through them. Their capillaries
are distended with blood, and Pulmonary
Hemorrhage is threatened. Yet all this
is the result of a little delay in the transit
of the blood through the left auricle and
through the lungs; but we must guard
ourselves against supposing that it is
merely adiaphoria that is required in
order that the currents of blood shall
prove an effective medium of supply
for the wants of the frame. Our systems
are constructed in such a way that
whether the blood moves rapidly or
slowly it shall during healthy circulate
easily: and if we examine the subject
will care we shall find that it is
the want of correspondence between the
capacity
The capacity of the movements of the central organ add that of the fluid propelled which gives rise to nearly all the mischief that we so often trace to aortic and mitral disease. I consider that a clear idea of this subject is of the first consequence to a proper knowledge of the disease which follow upon accelerated or otherwise altered circulation. It is then to be kept constantly in view, that mitral valve disease gives rise to so much mischief and because the rate of the circulation is actually diminished but because the capacity of the flow of blood through the body does not correspond with that of the propelling apparatus. The right ventricle whose duty it is to drive the blood, which the heart from the right auricle, through the lung, as friege have been exerted, suffers an amount of assistance in the performance of its function which in a short
short time effects a most important change in the circulation throughout the body. The lungs being comparatively loaded with blood - partially aspirated in such a manner as to make it difficult for them to accommodate the blood which the right ventricle attempts to force into them. It is easy to see that dilatation of the right ventricle must be the result of this resistance on the part of the lungs, but there is a certain peculiarity in the construction of the ventricle that is well deserving of our attention. I speak of the so-called "Safety Valve Gullet" of this organ. It is true that the right ventricle must dilate, but it is interesting to know that it cannot dilate in such a way as to undergo the traumatic valve incompetency. We need not enter here upon any discussion as to what might happen were the tricuspid valve to remain as incompetent as ever, for the more we investigate the government
Of the human body. The more profound do we find it in all respects to be. As a regurgitation of blood from the right auricle to the left auricle is the inescapable result of the triune spiral valve, let us consider how this will affect the whole system.

In regard to the Heart, we observe that a remarkable provision has been made to insure its safety: a valve is placed over the entrance of the coronary vein to the auricle, and thus, for all regurgitation upon the substance of the heart, its safety has been effectually preserved. We can scarcely overestimate the importance of this provision, by which the central organ of the circulation is preserved in a great measure from the injurious prejudice to which all other parts of the system are subjected. For since there are no valves placed over the entrance of either the inferior or superior vena cava: and since, on this account, all the parts from which these great vessels return the blood are subjected to
constant interior pressure, we may
easily form an estimate of the extent
of mischief that should follow upon
which lesions as we are now investigating.
In some patients this heart disease
begins to act almost at once. Life finds
them becoming more and more debil-
itated and finally sinking under
an accumulation of diseases of which,
as might have been expected, pulmonary
failure, rigor and general Droop due
by no means to these in particular. But
there are many also who do not seem
to suffer very serious inconvenience
until while the heart is excited to a
much greater degree than usual even
in these cases. However, the sufferers do
make to feel from time to time that
this health is by no means secure
and that life itself is held by a
very slender tenure - by neither the
effects of internal cause or disease of the
heart. One or or are not immediately apparent
we know well enough that the patient
is continually subject to such trifling exciting causes as would scarcely disturb
the harmony of a sound system at all.
His power of resisting the invasion of
autonomic causes has suffered very
materially: and thus a slight exposure
to cold or damp will almost inevit-
able bring upon him an attack of the
shakes, dyspepsia and even Kline or
extremities - sometimes dysmonstalas
and tendency to congestion in the brain.
Every attack will be found to have
its own peculiarities in regard to
the organ affected or mode of attack.
This consider is merely what we
ought to expect when we remember that
they differ from one another in temperament
and in their mental endowment.
From
what I have said it must be evident that
our vital disease predilections in a high
degree to many other affections and that
this predisposition is the result of
mechanical obstruction to serious return.
As yet we have considered the heart as
acting
acting with full force in propelling the blood along the aorta, and to the question may next arise, how does the system not yield under its difficulties in every case? We shall find that in this, as in many other circumstances, the system is preserved from fatal injury by exquisite devices. The same imperfection in the vascular apparatus which prevents the easy return of blood protects the systemic element against pressure from behind. Of the return of blood to the heart is now much more difficult than it was previously to the evacuation of the vascular sinuses. No vid-a-togo is also materially diminished in intensity. It seems as if at one stroke an injury had been inflicted from which the system could not have recovered had not the means of relief been learned by the same event. I have spoken of critical valve disease as being the best illustration. I could bring forward of the mode in which a mechanical obstruction might induce extensive injury to the latent system.
In this instance the heart becomes hyper-
+ trophic and various cardiac conditions
are likely to be induced. The left auricle
throughout, ventricles and right auricle
are the only cavities whose walls are much
thickened. When the aortic valves are
also incompetent, there are severe thickening
of the walls of all the cavities, but the
other results do not differ from those already
mentioned. There would not indeed be a better
subject than this for the contemplation of
those who desire to see nature's method of
preserving the body against disease.
Now allow the results of some disease
already mentioned. Other the most extensive
system that we know of there are other
examples of obstructed circulation to be
met with in the body: more limited
in the effects which they produce but
equally real in the results of their
production. Hepatic disease blocking
obstruction to the return of blood from
the stomach, from the stomach, small
and great intestine, pancreas and
Lyleon
Upham, may he taken as an example.

Records and hemorrhage from the interstitial space will have an obvious connection with this disease, and it seems quite unnecessary to dwell any longer on the question. Under various circumstances, with all of which we are not yet acquainted, the granular degeneration of the kidney takes place; and this, it appears to much more obstruction of the circulation than we could be apt to imagine. Sometimes this granular kidney does not take the result of chronic inflammation and in such cases it is hard to be remediable. But at others, the deposit of oil granules in the secretory cells of the organs is without doubt the principal lesion we can discover. In whichever way the kidney is disabled from performing its functions, we have been certain, namely, that albumen is poured out in a very considerable quantity from its capillary vessels and thus in a short time the quantity of the blood throughout
Throughout the entire system undergoes a serious change. I do not intend to enter upon the whole in which discharge of the albumen by the urine is believed to take place—nor do many views are held upon this point. That better good be get by discussing it. It seems certain enough that the secretion cells do become filled up with oil and that the eliminating power of the organ is materially diminished. The podia and other degenerated matters exuded in the urine are not cast off from the body as they ought to be and therefore constant danger threatens the system. The blood which is sent to the kidneys in very large quantities is longer able circulate through the organ as freely as it was wont to do. Exactly what takes place in the lungs when these organs cease to operate the blood efficiently seems to occur also in the kidneys. The blood which is sent to this highly important excretory organ...
Certainly only in the calm 
and silent 
and of kind 
& Sher of others
organ for the purpose of being unloaded of certain poisonous matters. Not being
shocked with this should be. Angers in the capillaries and finally instead of
becoming extravasated into the tubes is gradually transuded into those and
is rendered the urine decidedly albuminose.
I say that most likely the transudation
of the serum of the blood which takes
place in granular degeneration of the
kidney is due to delay in the transit
of blood through this organ. Unless
that he that contracts of believing before
with the same portion of blood for a
length of time has a deteriorating influence
upon it or not I can not pretend to
say. But there is good reason to believe
that whenever delay in the progress of
the blood has existed for some time
the tissue does become in some measure
deteriorated. Let us glance now for
a moment at the probable results of
that improvement of the blood which
we find to operate upon the
granular
granular condition which constitutes
The chief feature of chronic "Bright's
Disease". The blood when of this abnormal
constitutions is admirably adapted for
rapid and easy transmission through
the capillaries of the entire system. 

There is indeed good reason to think
that an exceedingly liquid matter
is set by any fluid so well suited
for a quicker transit through tissues
formed of animal membranes. Life
must be judged of the Human body
by what the mind is able good to
your own experience upon dead matter,
at all events we know does the constitu-
tion of the blood become altered by the
loss of alluminory matter discharged
from the kidney than we find in
the circulation to be obstructed throughout
the entire system. Very often the
renal affection is complicated
with cardiac disease; and in these
cases as might be imagined we have
for greater difficulties in ameliorating
the symptoms.
The symptoms, but even when there is no other observable lesion than that of the kidney, we find Anabareia established with great facility. The same remark, however, which was made in a reference to calcarular disease, also holds good in the circumstances now under our notice. Pathological officers are frequent, but not inevitable. To well call the system adapts itself to the difficulties under which it is often placed. That rescue does not necessarily supervise upon any organic lesion whatever unless the ordinary exciting causes of disease are applied. In the preceding pages I have glanced rapidly over the great causes of restricted circulation, and in particular I have traced out the study in which calcarular disease of the heart affects the return of blood from the great organs of the body. The review has been a rapid one but for most practical purposes sufficiently long. We could not dwell there more.
Surprised treatises written on this subject than we already have in the works of our more eminent Physicians and therefore I the less regret the imperfections of this dissertation. Some considerations there are however, which cannot fail to attract attention; and these I may own briefly mention.

One point is that previously mentioned in regard to the importance of an accurate correspondence between the various parts of the circulatory system. It cannot be merely a difference in the rapidity of the movement of the blood through the body that causes make the decided difference between health and disease. For the judge in one Instant may be 80 in the minute that in another may be 60 at one time and 90 at another. There seems in truth to be much more in the want of correspondence as to rate between the Heart and the general circulation than is generally thought. Another point.
worthy of our attention is that, if the action of the heart, in which the blood is furnished by a diminished force, in the wall of blood from the heart, as there is not to force a return permitted at all events, the system is not subject to a forcible pump which it could not exist with. At the same time I cannot admit that the whole subject of obstructed circulation appears so very clear as I could wish it to be. I speak of the heart, having the blood and of the vessels transmitting the blood very much in the same way as if the heart were a force pump and the arteries capillaries and veins just as many check-toties. But we cannot think of these organs after that fashion. There can be no doubt that the capillaries themselves exert a most powerful influence upon the circulation.
circulation of the blood: and perhaps what we are apt to consider merely to
The result of prepuce or as we call
in connection of these depends may be due
inability to some modification of the
processes of nutrition but well understood.
For anything great I do not expect to
make much more of this subject. The
difficulties which beset not all
investigations into the processes of
life would lead me to the belief that
our only plan of improving our
knowledge of the animal economy is
diligent observation of the phenomena
presented by living animals in a
healthy and diseased state: and that
any attempt to acquire a more intimate
acquaintance with the molecular relation.
ship existing between the fluids
and solidly which constitute the animal
frame may be as much left aside as
entirely hopeless.

David H. Lipscomb