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PART I.
ORIGINAL COMMUNICATIONS.

ART. IX.—*An Essay on Wounds of the Heart.* By CATH-
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[Read before the Dublin Medico-Chirurgical Society.]

IN our various class-books of surgery, as also at our lectures, the subject of wounds of the heart is always fully entered into, but almost exclusively with reference to injuries of the lungs. There is however another viscus contained in this cavity, one which certainly plays no inferior part in the organization or continuation of human existence ; one of that system of organs which Bordeu has so expressively denominated as the tripod of life : and which, whether regarded merely anatomically as a beautiful specimen of complicated structure, well adapted to fill its office, as one of the most active and important agents of the animal economy, or considered more abstractedly as being subject to the most frequent physical and moral influences, I conceive that its lesions, though generally passed over in silence, yet possess the deepest interest in every point of view, physiological

and pathological ; and it is to this subject that I propose calling the attention of the Society to-night, I allude to wounds of the heart, that is, physical lesions of continuity of its structure, produced by the action of wounding instruments.

The opinion that all wounds of the heart are necessarily and instantaneously fatal, reigns generally among unprofessional persons ; but though it be quite true that they are among the most fatal of penetrating wounds of the thorax, constituting their most serious complication, and are, generally speaking, mortal, yet as there are recorded many well authenticated cases of individuals, who have survived, some for days, others for years, although presenting all the rational symptoms of a wound of this organ ; the examination of animals killed in the chase, and in the substance of whose hearts bullets and the heads of arrows have been found, with also the cicatrices of former wounds ; from all these circumstances I think we may infer, that wounds of all parts of the heart, provided they are not very extensive, are neither necessarily nor immediately fatal. And, in support of this opinion, I shall merely select a few out of the many cases that are recorded, and previous to detailing the cases, I may remark *en passant*, as a curious fact, that while British surgery affords us but few examples of these accidents, the continental records are pretty numerous : whether this is owing to our not publishing the cases, or that we are more circumspect in *les affaires de cœur* I cannot say.

Ambrose Parè states that he witnessed a case where a person after being wounded by a sword thrust in the chest, pursued his adversary for two hundred paces, and then fell dead ; on examination he found a wound in the heart large enough to receive his finger, and a large quantity of blood effused on the diaphragm.

Hennen, in his *Principles of Military Surgery*, quotes an highly interesting case of a soldier, who received a sword wound in the chest, and was left on an open staircase for five days, during severe winter time ; he lived ten days after being brought

to hospital, and died of gangrene of the legs, caused by the extreme cold to which he had been exposed; on dissection it was found that the right lung had been wounded, the right ventricle of the heart laid open, but this wound was perfectly cicatrized.

Dupuytren was decidedly of opinion, that these wounds were not necessarily fatal; and in his *Leçons Orales* he alludes particularly to the case of a soldier, in whom, six years after the healing of a wound of the chest, a musket ball was found impacted in the substance of the right ventricle of the heart near its apex.

He also gives the case of a man, thirty-four years of age, who was brought to the Hotel Dieu, May 5th, 1831, having received two stabs of a knife, one in the præcordial, the other in the epigastric region; there was no evidence that the wound had penetrated, as the heart's action and respiration were regular, the patient complained but slightly, and auscultation and percussion discovered no morbid phenomena. He had, however, a general spasmodic trembling. He died on the 13th with symptoms of diseased brain, having been affected with tetanic spasms for two or three days previous to his death; there was a wound of the pericardium of three lines, which also penetrated the cavity of the left ventricle, the pericardium contained $\frac{3}{4}$ i. of serosity, and Dupuytren thought he might have survived if the head affection had not supervened.

He also gives another case of a man who died mad, after attempting suicide by amputating the penis, and in whom six penetrating wounds of the right ventricle were found after death, although during life there were no symptoms indicative of such a lesion; now, were it not that both of these patients had died from disease of the brain, and that the morbid state of the cerebral functions, could thus account for the diminution of sensibility and perception, I should feel inclined to adduce them in favour of that proposition of Harvey, which has been denied by Mor-

gagni, viz. the insensibility of the heart : on which subject, I think that the following case bears very strongly. In the Museum at Martinique is preserved a heart, with the end of a sword five inches in length impacted in it. The case was that of an officer, who in a duel received a sword wound in the right side of the chest, the point of the weapon broke, and the seconds supposing it to have been lost in the grass, walked with him to the hospital, where he expressed so little uneasiness, that the surgeon, supposing it to be a mere flesh wound, allowed him to return on board his ship, where he continued without any suffering the whole of that day, but at night very severe symptoms supervened, and he died next day ; on examination, it was found that the point of the sword had passed through the right auricle, and wounded the left lung.

Mr. Carlile, Demonstrator of Anatomy at Trinity College, is of opinion that the heart is to a great degree insensible, as he mentioned to me that in his experiments on the motions and sounds of this viscus, he found that punctures of its substance affected its motions but slightly, and even on inserting tubes through its parietes into the cavities, though at first there was some slight palpitation, yet it soon accommodated itself to their presence ; but he found that if he compressed the nerves going to its substance, by passing a ligature round the aorta and pulmonary artery, much suffering was evinced.

In some cases, however, instant death follows the infliction of the wound, and this is an important consideration in a medico-legal point of view, as in the case quoted in Beck's Medical Jurisprudence, and which has been laid down also by Mr. Wallace in a clinical lecture on this subject, published in the *Lancet*.

Dr. Corrigan has kindly shown me a preparation in his possession, of a wound of the right ventricle which was followed by instant death : the case was that of a bailiff who was stabbed in the belly with a long knife, by a person standing upon the

stairs under him ; the knife penetrated the diaphragm just below the seventh rib, entered the abdomen, re-entered the diaphragm, and perforated the right ventricle of the heart near the base.

To show the dreadful havock that is sometimes caused by gunshot wounds of this organ, I shall briefly state the notes of two cases that I witnessed myself, during a period of time that I had the opportunity of dissecting the bodies at the Morgue in Paris, under M. Devergie, who is appointed by the French government to make a medico legal investigation of the bodies brought there. In one case, the third, fourth, fifth, and sixth ribs were fractured in several places, so that the left side of the chest was largely exposed ; the pericardium was quite torn away, so that the heart protruded through the wound ; there was a large lacerated wound at the base of the left ventricle, with extensive laceration of the aorta ; two balls were fixed in the body of the eighth vertebra. This man had been found lying dead in his room with a musket beside him, so that it was presumed he had placed the muzzle of the piece against his heart, and discharged it with his foot.

In the other case the ball had fractured the sixth rib, passed through the left ventricle, lacerating it extensively, pierced the body of the sixth dorsal vertebra, and passed out through the back.

I think the best classification of wounds of the heart is into punctured and contused ; the simplest form is that of acupuncture, the most serious is that which is complicated either with a copious hæmorrhage, or a foreign body remaining in the wound. Of the first of these complications, the late Duc de Berri (who was assassinated at Paris in the year 1820) afforded a remarkable example. He was stabbed in the right side, the right ventricle was pierced through, and the hæmorrhage into the cavity of the pleura was so considerable, as to oblige Dupuytren to open the wound every two hours while life lasted, in order to prevent impending suffocation ; he lived in this state for seven hours.

The second complication may be caused, either by a fractured portion of a rib, or by a part of the weapon remaining in the wound. In the museum at Park-street, Mr. Thomas Hart had the kindness to show me a preparation of wound of the right auricle; and Mr. Wilkin, who was clinical resident in Stevens' Hospital at the time it occurred, has given me the particulars of the case. It was that of a brewer's man, who had fallen under a dray, when it was heavily laden, which passed over his chest; he was lifted up, and complained of pain and weakness, but was able to continue sitting on the side of the dray driving the horse for nearly an hour, when being in the vicinity of the hospital, he thought he might as well get himself examined: he walked in, and lay on a bed, but on turning on his side he suddenly expired. On dissection, it was found that the fifth rib was fractured, and that the extremity of one portion had penetrated the pericardium, and right auricle of the heart; it filled up the perforation of the pericardium, but had freed itself from the heart; and this, as Mr. Wilkin observes, accounts for the sudden death of the man. For it is probable, that the portion of rib had filled up the wound of the heart, and thus prevented any hæmorrhage until his arrival at the hospital; when, on its coming out, the sudden effusion of blood into the pericardium caused sudden death; there had no blood escaped outside the pericardium.

Mr. Robert Smith has given me notes of a case which is preserved in the museum of the Richmond Hospital. It is that of a woman who was jammed between a wall and a cart heavily laden, and died almost instantly; upon examination, several ribs were found to be fractured and driven into the substance of the lung, the pericardium was distended with blood, the superior vena cava having been torn almost completely across from the right auricle.

As to those cases, in which part of the weapon remains in the wound, Orfila quotes an interesting observation in his *Medicine Legale*, of a workman who, in a melancholic mood,

stabbed himself with a sharp stilet, between the fifth and sixth ribs of the left side, on the 24th of May. He was brought to hospital on the 26th, in a state of great collapse, the pulse small, intermitting, respiration hurried, great anxiety, and severe pain felt; on touching the wound, which was nearly cicatrized, but just below it, a peculiar thrill could be heard, or as it is expressively denominated a *crepitation onduleure*, similar to what can be heard in a varicose aneurism: the horizontal position caused great pain. On the 3rd of June he had severe rigors, followed by erysipelas of the face, and he died on the 13th, that is, twenty days after the receipt of the wound; on examination of the body, the pericardium was found to contain ten ounces of fetid bloody serum; in the inferior third of the right ventricle was impacted an iron stilet, which, penetrating the septum, could be felt in the left ventricle.

In contused wounds of the thorax, the heart, from its mobility, I should think, would be less likely to suffer injury than the other viscera of this cavity; but in the last siege of Antwerp by the French, some remarkable cases occurred in which this organ was severely contused, and ruptured without any external appearances of injury, either to the integuments or ribs, in which the death, in some cases instantaneous, was supposed to have been caused by the wind of the bullet. In some of the cases mentioned, a violent acute pneumonia supervened, in others death followed from an effusion of blood into the cavity of the pleura.

In some instances, although the tissue of the heart has not suffered any solution of continuity, yet the violent commotion which it has sustained has caused the suspension of its contractions, and a state of syncope so prolonged as occasionally to prove fatal, but not necessarily so.

A case of this description occurred while I was at Paris, and as I knew the parties concerned, and saw the patient shortly after his wound, I can vouch for its accuracy. Two French students quarrelled at supper, they wished to settle their dis-

pute on the spot, however as they were both very tipsy and infuriated we prevented them; the next morning they met, and as they were determined that one should die, their friends prevailed on them only to load one of the pistols, and then leaving both on the table, to draw lots as to who should take the first chance of the pistols, of course being ignorant which was the loaded one; it was loaded with four pellets. They then mutually felt for the point of the chest, against which at that moment each stroke of the heart told with increased violence, and pressing firmly against this part, they fired: one of them fell to the ground in a state of insensibility, but on examining him they found merely a slight flesh wound at the part to which the pistol had been applied, and with a little care he soon came to himself. I saw him about three hours after this had occurred. He was then in a state of great anxiety which he could not account for, as he expressed more an unpleasant sensation of weight about his heart than actual pain; there was great tendency to fainting, the pulse intermitted, with severe palpitation of the heart: under proper treatment all these symptoms subsided, and he recovered perfectly in a short time. I consider myself peculiarly fortunate in having witnessed this case, for in affairs of this kind it is generally the right side which is wounded, owing to the position we naturally assume; and also, it exemplifies in a striking manner the power of compressed air in resisting the expansive force of gases.

All parts of the heart are not equally liable to be wounded, for in a series of fifty-four cases collected by M. Olivier, the right ventricle was the seat of the wound in twenty-nine, the left ventricle in twelve, both ventricles in nine, the right auricle in three, the left in one. The same author states, that out of twenty-nine cases of penetrating wounds of the cavities of the heart, only two proved fatal within forty-eight hours; in the others death took place at the varying periods of from four to twenty-eight days after the receipt of the wound.

These differences in the time at which death has occurred

in individuals whose wounds have presented nearly the same appearances, as also why they are not immediately fatal, have been attributed to the peculiar disposition of the muscular fibres of this organ ; for as the heart is constituted of layers of superposed fibres having different directions, if the instrument has divided a great number of its fibres in a transverse direction, the retraction will be considerable, and the probability of hæmorrhage much greater than if the wound ran parallel to these fibres ; thus suppose the left ventricle to be wounded, there are three layers of fibres in its substance, the superficial and middle layer take one course, the deep layer takes an opposite direction, so that while one set of fibres are divided transversely, the others are merely separated longitudinally, and thus favour the formation of a coagulum, causing an obstruction to further effusion ; at first merely temporary, but finally definitively ; so that we may assume, that wounds which are parallel to the axis of the heart, are *cæteris paribus*, less rapidly fatal than those which are transverse ; and it is this action of the fibres which renders wounds of the ventricles less rapidly fatal than those of the auricles.

From a careful review of the facts which I have enumerated, I think we may infer that these wounds, though very dangerous, are neither necessarily nor immediately fatal ; but in making our prognosis, we must bear in mind the depth to which the instrument has penetrated, the direction of the wound with regard to its fibres and extent, the form of the instrument, and whether it has remained in the wound or not, as all these circumstances materially affect the patient's chance of recovery ; as on them depends the state of the wound as to whether it shall remain open or not ; for if the wound divide many fibres transversely the retraction will be considerably greater, and the danger of effusion increased.

Now as to the immediate cause of death, some consider that the suddenness of death in cases of wounds of this organ is owing to the hæmorrhage draining as it were too suddenly the fountain of life, while Morgagni, Cruvelhier and others ascribe

it to the compression which the heart experiences from the blood effused into the pericardium ; from the unyielding nature of this membrane preventing its action. This latter opinion, I think, is greatly strengthened by the fact, that in cases of spontaneous rupture of the heart, where the effusion is confined to the cavity of the pericardium, the death is instantaneous, though the amount of the effusion be but inconsiderable ; also in cases of effusion resulting in acute pericarditis, syncope is of very frequent occurrence. In fact, syncope which, if prolonged, would terminate in death, seems (in one class of cases at least) to result from any encroachment on the narrow boundaries of the central organ of circulation, whether the intruder be of a solid, fluid, or gaseous nature ; thus we find that individuals after any great exertion, and in whom there seems to exist a temporary congestion toward the heart and lungs, are very prone to fainting fits ; also in dilatation of the aorta neighbouring the heart, in that state of false plethora also which results from exposure to great heat, as we experience in a warm bath or heated room, and which is supposed by many to be owing to a state of rarefaction of the constituent particles of our frame : in all those cases do we find a great tendency to syncope. And lastly, in those alarming cases in which death ensues so rapidly from the introduction of air into the veins, I have myself witnessed, when attending Majendie's experiments at Paris, the animal to drop dead as if struck by lightning ; dissection shewed us the heart enormously distended with air, so as to entirely fill the pericardium. This is a highly interesting fact in pathology, as showing how a common effect may be produced on an organ by two causes diametrically opposed to each other ; that is, sudden death produced by compression of the heart in one case, and by its dilatation in the other.*

As to the curative means to be employed in cases of wounds

* Dr. William Stokes of the Meath Hospital, whose accuracy in pathological investigation entitles any remark of his to deep consideration, is of opinion, that the

of the heart, they are reducible to the general treatment of those in other parts. However, the state of repose in which the body is placed after the receipt of a wound of this description, must exert considerable influence with regard to the formation of a coagulum ; but particularly the state of the mind demands our most anxious attention, for we know that Hewson, in his experiments on the properties of the blood, found that a state of terror rendered this fluid much more coagulable than otherwise. Now whether this may be owing merely to a state of immobility and a partially suspended action of the vessels, so often the first effect of terror ; or whether it may depend on some more inexplicable, yet no less intimate connexion between the state of the mind and that of the circulatory fluid I know not, but when we reflect on the powerful influence that mental emotion exercises over the action of the heart, so strong as in some instances to have caused death from a sudden burst of passion or of joy ; when we can trace functional derangement of this viscus marching step by step, and increasing according as the nervous system is subjected to the frequent and ardent operation of the varied emotions which swell our hearts ; when we consider the state in which we find the blood in those cases where death has ensued from some violent shock sustained by the nervous system, whether physically or morally, we find ourselves involved as it were in a circle without beginning or end ; we encounter a reciprocity of physical and moral agents involving the intricate but mutual dependencies and connexion of mind and matter. Their union and separation are mysterious—Nature cannot ex-

difference in the time of death may arise from a difference in the distensibility of different pericardia.

This is contrary to the opinion of Cruveilhier, who states as the result of a great many experiments, that the space between the heart and pericardium is only equal to the size of this viscus at its fullest state of distention.

Dr. Stokes ingeniously suggests, that if we could meet with a case of wound of the heart where there was no pericardium, or where it had been obliterated by previous inflammation, it would help materially to solve this difficulty.

plain them, and we must leave the solution of this problem in his hands from whom came the first impulse of the heart, and at whose mighty fiat it shall cease to beat.

ART. X.—*An Inquiry into the Management of the first Stage of Labour.* By EDWARD WM. MURPHY, A. M. M. D., late Assistant Physician Dublin Lying-in-Hospital.

“No person in labour ever had a pain depending on her labour which was in vain.”—DENMAN, *Introduction*, p. 171.

IN offering some observations on the management of the uterus during the expulsion of its contents, so as to avoid those disagreeable contingencies which sometimes are found to arise, I am liable to the charge of entering upon a beaten path where nothing new is to be discovered, one in which writers have over and over again pointed out every thing interesting or necessary to know upon the subject; and were it not that they have differed, and sometimes very widely, in their statements, that rules apparently the most settled have been questioned and their accuracy denied; that directions, the result of acknowledged experience, have been set aside by authorities equally respectable, and the practitioner often left to the natural strength of his judgment, if not to chance, for his success; it would be but an idle and gratuitous office to recapitulate what has been so often detailed before. The collective experience of all who have had the opportunity of putting the knowledge acquired from books fairly to the test of experiment and deductions derived from facts and not from doctrines, are perhaps the only reasonable means of ascertaining truth. It is with such an object that this inquiry has been undertaken, in the hope that some additional light may be thrown upon disputed points, some clue be found to escape from the labyrinth of conflicting opinions.

Simple as the natural progress of parturition may appear, there is scarcely a step of it, from the dilatation of the os tincæ