so that when the jaws are separated, it forms a suction socket for the head on the eminentia articularis, while in the lateral gliding movement of chewing it forms a smooth elastic surface on which the head of the bone moves. It also serves another very important function during chewing or scrunching of hard food, in that it acts as a buffer, breaking the abruptness of force transmitted suddenly through the jaws. You observe that the condyles of the jaw bear a very important relationship to the brain, any constant succession of jars upon which might result in damage to this very sensitive organ. The pugilist is thoroughly cognisant of this fact, and finds that he can most effectually knock out his opponent by striking him under the jaw. The amount of force required to do this is comparatively small as compared with the strength of blows usually delivered, but the whole of the force is transmitted through the condyles of the jaw to the skull and brain within a very limited area.

Let us pass on to the examination of the jaw of the edentulous subject. The angle again becomes obtuse since the factor which diminished its size, namely, the severe and habitual strain exerted by the masseter muscles has ceased to exist. The alveolar process has disappeared since the mechanical conditions that determined its development and continued existence, namely, the presence of the teeth, no longer exert influence upon it. What are the functions performed by the edentulous lower jaw? They consist in gripping the material between the gums and in breaking it up as much as possible in this manner. Every one of you must have seen such a subject eating, and must be familiar with the great freedom of movements of the lower jaw upon the upper in a horizontal plane. The anesthetist is fully aware of this. The jaw of the vigorous adult as a lever of the third order differs altogether mechanically from that in infancy and edentulous old age.

This movement results in a complete alteration in the anatomy of the temporo-maxillary articulation as it exists in the vigorous adult. The head of the bone becomes flattened on its upper surface, the fibro-cartilage is first perforated and then removed; and the eminentia articularis is flattened. If the nutrition of the old subject becomes very much impaired, the head of the bone and the flattened glenoid cavity become deprived of articular cartilage and then the opposing surfaces of bone by their mutual friction are gradually rubbed down and altered still further in form apparently by a process of decalcification and fibrillation.

Each condition of joint is perfectly normal to the subject at a certain period of life. What variations exist result simply and solely from changes in the physiology or function of the part. You can readily understand that, if such a considerable change takes place in the normal subject during a portion of a lifetime in obedience to mechanical factors only, enforced alteration in diet will readily produce such differences as exist in the jaws and dentition of animals which are closely allied, as, for instance, man and the higher apes. In other words this helps to substantiate the truth of the view I would place before you and which I hope to strengthen by subsequent evidence, namely, that the sole factor in evolution is a mechanical one.

REMARKS ON WOUNDS OF THE HEART,

WITH NOTES OF A CASE IN WHICH DEATH TOOK PLACE FOUR MONTHS AND A HALF SUBSEQUENTLY, AND CICATRISATION WAS SHOWN POST MORTEM.¹

By WILLIAM TURNER, M.A., M.D.,
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THERE unquestionably exists in the popular mind a firmly implanted belief that the heart of the animal organism is its most vital structure, that in order to attain the destruction of a life with the utmost certainty and with the utmost rapidity attention should be directed towards the destruction or disablement of this portion of the circulatory system. The deerstalker, for example, recognises that his best chance of promptly securing his stag is to aim well on the shoulder as being the best landmark for reaching the heart; and so

with big-game sportsmen generally. The bull-fighter maps out in his mind's eye a little area on the surface behind the shoulder-blade through which his sword must penetrate *en route* to the heart, if he is to succeed in quickly despatching his adversary. Military regulations direct that when an offender has to be executed by shooting, the firing party must point their weapons at the heart of the culprit, obviously with the idea that the extent of his suffering will thus be minimised. Indeed it has even been supposed that if the substance of the heart be touched in any way by a foreign body its action must necessarily and immediately cease.

Most surgeons, however, can of their own experience abundantly disprove such notions. I recently saw a child, aged 2 years, with a sewing needle driven into its heart. The whole needle had disappeared into the chest, but I could feel its head underneath the skin tapping against my finger with each beat of the heart, and I was thus enabled to cut down upon it and extract it, no evident harm resulting to the heart or to the child.

A case which much impressed me at the time in regard to the degree of laceration which the heart is capable of undergoing before it is brought to a standstill occurred some years ago in my practice as police surgeon. The dead body of a young man was discovered by the police lying in a secluded spot with a series of some ten or twelve wounds over the region of the heart. A large butcher's knife lay buried in one of these wounds to the depth of 4 inches, and the right hand, covered with blood, grasped the handle of the knife. No doubt could be entertained that these wounds had been self-inflicted. At the necropsy it was found that no fewer than three of the wounds had penetrated the cavities of the heart, and had caused considerable laceration of its walls. It follows, therefore, that after the heart had in this case been at least twice run into by a large butcher's knife, and much damaged, the subject of the suicidal attack had retained the physical strength and mental determination necessary to inflict a third wound in the same organ.

Although the records of such cases are not numerous, they mostly point to the fact that wounds of the heart are seldom if ever immediately fatal. Out of 29 collected cases of injury to the heart, only 2 were fatal within forty-eight hours.²

Of gunshot wounds of the heart some interesting examples are recorded. A stag ran 60 yards after being shot through the heart, examination of the heart showing that the left auricle had been practically annihilated, and the left ventricle completely torn through by the bullet.³ There is a well authenticated case in which a bullet was found embedded in the substance of a soldier's heart six years after he had been wounded, he having died from quite another cause.⁴

The following examples of penetrating wounds of the heart in which life was not immediately extinguished, may be interesting:

A soldier fell on his bayonet, which passed into his left side between the fifth and sixth ribs. Death took place on the fourth day. At the necropsy the wound was found to have penetrated the pleura costalis, passed over the thin edge of the lung, apparently without injuring it, perforated the pericardium, entered the left ventricle of the heart about $1\frac{1}{2}$ inch from its apex, and passed out through the mediastinum into the vertebral column.⁵

Muhlig⁶ relates the case of a mason who was stabbed with a stiletto on the left side of the sternum. His life was despaired of for a while, but he recovered sufficiently to return to his employment. Ten years later he was admitted to hospital suffering from excessive dyspnoea and anasarca, and with a loud double *bruit* accompanying the systole and diastole. After death the lung was found intimately connected with the pericardium by old adhesions, and the pericardium was intimately adherent to the heart throughout its whole extent. A rounded opening was found on the inner surface of the right ventricle admitting the little finger, and a corresponding hole in the interventricular septum leading into the left ventricle.

The heart in the case which I am about to describe shows a

² *Lancet*, October 8th, 1881.

³ *Ibid.*

⁴ *Ibid.*

⁵ *Med. Times and Gaz.*, November 7th, 1863.

⁶ *Med. Times and Gaz.*, August 3rd, 1861.

¹ Read at a meeting of the Gibraltar Branch of the British Medical Association.

cicatrized wound over the interventricular septum, and will be interesting as furnishing additional proof of the fact that the heart may be the subject of laceration from external violence, and still be amenable to the healing process.

The patient, a young Maltese, was admitted to hospital on October 21st, 1895, in a state of extreme collapse, bleeding freely from a wound in the left side of the chest over the region of the heart. I ascertained that during a quarrel with another Maltese he had been stabbed, probably with a large knife, and had almost immediately dropped on the ground. On examination in hospital, I found a horizontal wound in the chest over the cartilage of the fifth rib, and the cartilage itself was penetrated longitudinally by a slit $1\frac{1}{2}$ inch long. Bright arterial blood in considerable quantity was issuing in jets from the wound synchronously with the heart's contractions, and air was also passing with loud hissing noise on each movement of respiration. The heart sounds were muffled, and the pulse at the wrist was almost imperceptible. There appeared to be little hope of the patient's rallying, and his dying deposition was taken without delay. The surface of the body and extremities remained cold, and the pulse collapsed for twenty-four hours, when signs of returning warmth began to be observed. Breathing was very rapid, and the whole of the left side of the chest was absolutely dull on percussion.

A week later the patient's condition was still very critical. A sero-sanguinolent fluid was escaping in large quantity from the wound, and a cavernous resonance over the upper portion of the left lung indicated that pneumothorax had supervened. A month after the infliction of the wound the discharge from it was still abundant, and had become purulent. The pleural sac had become converted into a large suppurating cavity, and in spite of frequent antiseptic washings the character of the discharge did not improve. The fifth rib was therefore resected posteriorly so as to permit of a thorough drainage of the cavity, and a large rubber tube was inserted. The immediate effect of the operation was marked and satisfactory. Progress, however, was slow and fitful, and it was only after four and a-half months that the patient's condition allowed of his sitting up in bed and being moved about the ward in a wheeled chair. One morning whilst he was sitting up and having his wound dressed he suddenly threw back his head, went into a convulsion, and remained insensible till the evening, when he died.

Post-mortem examination revealed deep congestion of the posterior surface of the brain, and an apoplectic clot of some size resting upon and compressing the occipital lobes. No evidence of embolism was apparent. The immediate cause of death, therefore, was clearly apoplexy. On opening the chest the left lung was found to be collapsed and retracted upwards against the spinal column. The pleura was adherent to the pericardium, the interior of the pericardium and surface of the heart were granular, and some serous fluid was found in the pericardial sac. There was a cicatrix in the pericardium corresponding in position to the external wound, and immediately subjacent to it was discovered a cicatrix in the anterior surface of the heart itself. This cicatrix was three-quarters of an inch in extent, horizontally placed, and was situated over the interventricular septum, about $1\frac{1}{2}$ inch from the apex of the heart. It was found on section to have penetrated to a depth of five-eighths of an inch into the muscular substance of the heart. The left coronary artery and vein had been cut across. Apparently therefore the wound of the heart, although it probably had a remote influence in determining the fatal issue in this case, was not the immediate cause of death, and evidence to this effect was given at the coroner's inquest and at the trial.

It appears almost certain, and yet almost incredible, that after the infliction of the wound the pericardium must have been filled up with blood from the division of the coronary vessels, and yet the heart's action was not thereby brought to a standstill, but even entirely recovered from so gross an impediment.

MEDICAL MAGISTRATE.—Dr. T. Tinley, of Whitby, has been appointed to the Commission of the Peace for the North Riding of Yorkshire.

THE AUTHOR OF THE EMBRYONIC THEORY OF TUMOURS.

By JOHN J. EYRE, M.R.C.P., and R.C.S.I., D.P.H.CAMB., Rome.

MR. W. ROGER WILLIAMS in his interesting paper on *The Rôle of "Rests" in the Origin of Tumours*, read at the Carlisle meeting of the British Medical Association, and published in the *BRITISH MEDICAL JOURNAL* of October 10th, p. 1021, where he speaks of "when Cohnheim first announced his celebrated theory of the origin of tumours from sequestered fragments," has fallen into a very justifiable, because almost universal, error amongst pathologists outside of Italy in considering Cohnheim as the author of the embryonic theory of tumours; that is, if we accept the dictum that the person who first publishes a theory, and at the same time gives evidence that this theory originated in his brain through investigations made by him, should be considered as its author. This being admitted, there is not the least doubt that the true author of the embryonic theory is Francesco Durante, the eminent Professor of Surgery of the University of Rome, as is clearly proved by a monograph entitled *Nesso Fisiopatologico tra la struttura dei Nei materni e la genesi di alcuni tumori maligni* [*The Physio-pathological Connection between the Structure of Maternal Nævi and the Genesis of some Malignant Tumours*], written by him and published in the *Archivio di Palasciano*, May, 1874.

Perhaps the best way to present the evidence which undeniably proves the prior claim of Professor Durante to this theory will be to give the literal translation of an extract taken from a paper published by Durante in *Il Policlinico* of January 1st, 1895, which not only contains that portion of his original monograph in which he stated his theory, but also a very interesting account of the genesis of the theory in his mind.

The frequent appearance of malignant tumours in these congenital productions, which are commonly called maternal nævi, already observed by many clinicians, especially impressed me in two cases. After I had treated surgically two dermoid maternal nævi I saw two sarcomata rapidly arise. I therefore thought that a predisposition to the development of malignant tumours must exist in them. I studied the pieces removed before the appearance of the neoplasms microscopically, and in both I found an angiomatous tissue, composed of capillaries in one and of sanguineous spaces in the other. The stroma in both consisted of round and fusiform young cells, although at first sight the sanguineous canals did not appear furnished with walls proper. I therefore convinced myself that these elements with embryonal characters were congenital germs, which, incompletely extirpated by me and irritated by the operation, gave origin to the sarcomas.

To strengthen still more the concept that I had formed I instituted histological researches on numerous maternal nævi removed from cadavers appertaining to individuals of diverse sexes and ages. I found that these congenital productions were generated either by an anomaly of development of the papillary bodies or by an irregular arrangement of the epidermic cells. In the greater number of them, excepting the pigmentation of the mucous body of Malpighi and of some connective tissue cells of the derma, the epithelial elements and the connective tissues were seen completely developed, and the delimitation between the derma and the epidermis was still very recognisable. In a relatively very small number of the nævi I observed in the dermoid type, in place of the fibrous tissue, the above-mentioned young cellular elements; in the epidermoid, branches of epithelial cells which descended deeply into the derma, in which they gradually lost the cutaneous epithelial form through being reduced in the deepest parts to nests of embryonal elements.

This research led me to the belief that malignant tumours develop in the last species of nævi, which contain congenital connective tissue and epithelial germs. Then embryological and teratological studies, anatomico-pathological observations, and the evolution of certain organs at the period of puberty presented themselves to my mind, and from a consideration of all these facts, I came to the conclusion expressed in a little memoir on the structure of maternal nævi, published May 26th, 1874 in the *Archivio di Palasciano*, that "the elements which have preserved embryonal anatomical characters in the adult organism, or which have re-acquired them through a deviation of the chemico-physiological activities represent for me the generating elements of every neoplasm properly so-called, and especially of those which are malignant. Such elements remain included in the well-developed tissues for years and years without giving an inkling of their existence. When an irritation, a simple stimulus, suffices to excite in them that movement and those cellular properties that heat excites in the elements of the germinative macula of the eggs of birds which have lain inert from the moment that they are laid. In fact, if we reflect for a moment how much the disposition of the tissues which co-operate in the organic construction of an epithelial cancer may be complicated, we must at least admit that the genesis of cancer in a limited point of the organism is due to the reproduction of entire embryonal acts, represented by the cells that possess the necessary anatomico-physiological properties.

This theory of Durante's was published in Italy, and