

GROUX (E. A.)

REPORT UPON THE CASE OF THE LATE
DR. E. A. GROUX.

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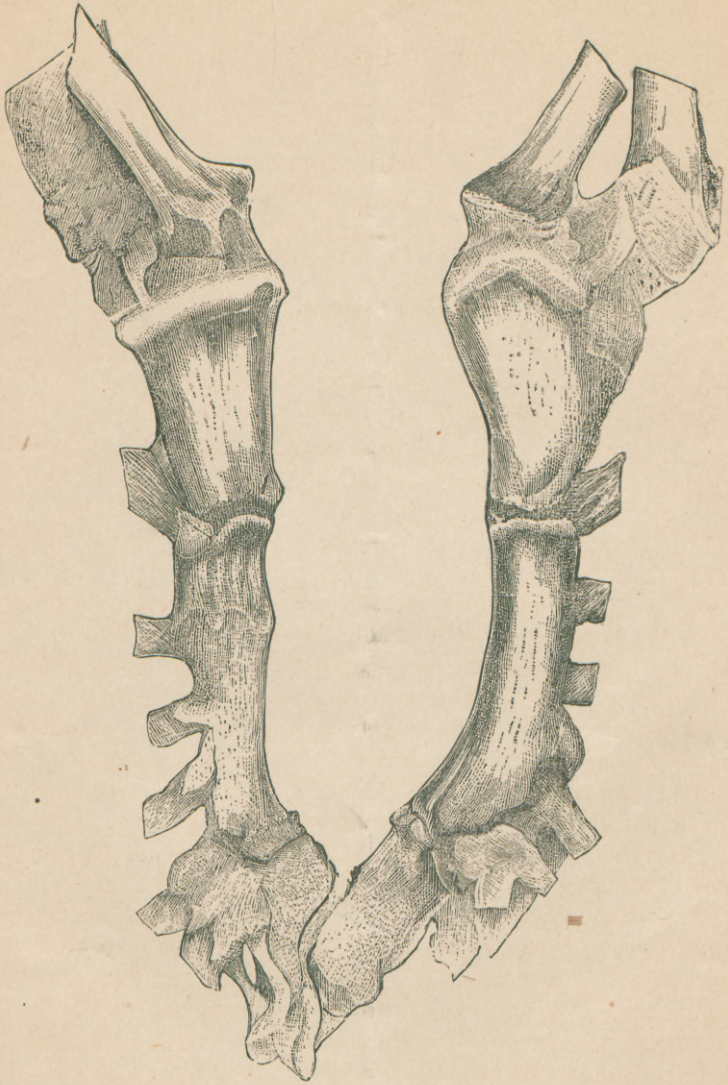


FIGURE OF STERNUM FROM THE LATE DR. E. A. GROUX.— $\frac{3}{4}$ SIZE.

REPORT UPON THE CASE OF THE LATE DR. E. A.
GROUX, TO THE BROOKLYN ANATOMICAL
AND SURGICAL CLUB, NOVEMBER 18th, 1878.

BY CHARLES JEWETT, M.D.



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County of Kings.)*

Dr. Chas. Jewett presented the sternum removed from the body of the late Dr. E. A. Groux, with an account of his case, as follows :

By imperfect foetal development the sternum may be perforated by a small foramen at its lower portion; it may be partially or wholly divided by a vertical fissure, or it may be entirely wanting. The occurrence of a sternal foramen is by no means rare. Fissures occur oftener in the lower than the upper portion of the bone, and are rarely complete.

These malformations of the sternum are due to failure of the primitive cartilages to unite in the foetus, and obviously are not explained by failure of ossification as stated by Gray and others.

“The osseous sternum is preceded by a continuous or non-segmented piece of cartilage; and as the portion of the body in which this is developed is formed by the union in the middle line of the two ‘ventral laminae’ of the embryo, traces of this original median division are generally seen in very young sterna, and are often persistent through life in the form of fissures or fenestrae in the middle line of the sternum.” (W. H. Flower, *Osteology of the Mammalia*, p. 73.) They accord in their order of frequency with the fact that the closure of the thoracic cavity in the embryo progresses from above downwards.*

* Humphrey on the Human Skeleton.

When the bony fissure is complete, the arrest of development usually involves also the overlying soft structures, the thorax thus being entirely open and the heart exposed—*ectopia cordis*.

The rarest of these imperfections of the sternum is a complete median fissure of the bone, with no other failure of development. To this class belongs the case of the late Dr. E. A. Groux. This case has for many years been an object of medical interest throughout the world, and has been the subject of numerous publications, both in this country and in Europe.

In the *American Medical Monthly*, January, 1859, was published the Report of a Committee of the New York Pathological Society appointed to examine Dr. Groux.* I quote from that report: "There is no deficiency of bony substance, but simply a median fissure. The clavicles are articulated with the lateral halves of the sternum, and the costal cartilages join the bone on each side in the usual manner. The sternal attachments of the sterno-mastoid muscles are also in their natural positions; but the sterno-hyoid and sterno-thyroid muscles, both right and left, are attached below to the left half of the sternum.

The left half of the sternum is also situated upon a plane somewhat anterior to that of the right; so that when the two edges of the fissured bone are drawn together by muscular action, the left edge projects in front of the right. When Dr. Groux stands erect in an easy position, the fissure is one inch wide at the widest part, *i.e.*, about the junction of the upper and middle thirds.

By forcible separation the width at the same point is two inches; by forcible approximation, one-quarter inch.

The impulse of the heart is normal in character, and is felt a little above the level of the fifth rib, a little inside the plane of the left nipple. In the medio-sternal space, in the ordinary erect position of the body, is visible to the eye a pulsating tumor, situated, apparently, just beneath the integument. The pulsations of this tumor extend from the second to the fourth intercostal space, and from the median line to the left edge of the fissure.

They consist of alternate contractions and dilatations which correspond in frequency with the pulsations of the heart and arteries. The contractions of the tumor are synchronous with the impulse of the heart at the level of the fifth rib.

When Mr. G. takes a deep inspiration, followed by a long slow forcible expiration, the pulsating tumor in the medio-sternal space disappears at the time of inspiration, but toward the end of expiration it again shows itself, and gradually becomes very much increased in size.

* This committee consisted of Drs. J. C. Dalton, J. T. Metcalfe, and E. R. Peaslee.

This pulsating tumor has been considered by different observers to be, first, the right auricle;* second, the right ventricle; third, the aorta.

[By some the great veins were believed to constitute a portion of the pulsating tumor.—J.]

The committee are of the opinion that the pulsating tumor in the medio-sternal space is the right ventricle."

Dr. Groux died October 15, 1878, at the age of 45 years. The autopsy was made October 17, by Dr. Henry Riedel, of this city. Professor J. C. Dalton, of New York, and a large number of other medical gentlemen were present. Our President, Dr. L. S. Pilcher, Dr. G. W. Baker, and your reporter were among the number.

Before opening the thorax, the trachea was ligated, to prevent displacement of the heart by collapse of the lungs.

An incision through the skin and superficial fascia opened directly into the anterior mediastinum. No other structure bridged the space between the lateral halves of the bone.†

The heart was found normal in size and shape, and normally situated, except that the position was slightly higher than usual, the apex presenting at the level of the upper border of the fifth rib. The right auricle lay wholly to the right of the median line. The position of the right ventricle corresponded precisely with that of the pulsating tumor described in the above report.

The anatomical appearances of the malformed bone are well displayed in the accompanying figure. Were the lateral halves united a slight deficiency in width would be seen at the upper portion of the manubrium, perhaps one-half inch. The lower segment of the gladiolus would also be found somewhat smaller than usual. Otherwise there is no deficiency of bony substance.

It will be seen that the articulations of the fifth, sixth and seventh costal cartilages deviate somewhat from their normal relations to the lower segment of the gladiolus. While the fissure divides the entire bone, the lateral portions of the lower segment of the gladiolus articulate with each other. Each articular surface is covered by a cartilage, and the two parts of the bone are bound together by external ligamentous bands. The articular cartilages of this joint blend below with the ensiform appendix.

The vertical depth of the fissure from the level of the sterno-clavicular articulation to the bottom of the cleft is four inches.

* Among these, Sappey, Bernard, Magendie, Richet, Verneuil, Hammernik, Pavy, and many others.

† The Committee of the N. Y. Patholog. Soc. reported that this space "was apparently covered with a strong subcutaneous fibrous sheet of aponeurosis."

Width at the level of the first costal cartilage, one inch.

Width at widest part, 1.4 inch.

The specimen has been carefully prepared by Dr. Pilcher, for the Museum of the Anatomical and Surgical Club, to which it has been formally donated by the widow of Dr. Groux.

Among similar cases of malformation or absence of the sternum that I have been able to collect are the following:

In the *American Practitioner*, Oct. 1878, Dr. J. T. Hodgen, of St. Louis, reports a case of congenital fissure of the sternum, with exstrophy of the heart. The heart was wholly outside of the thorax. The integument was continuous over the fissure, except an opening in the median line, through which the vessels passed. The child died on the fifth day after birth. The sternum in this case presented an U-shaped cleft, extending down to a point opposite the articulation of the fourth rib with the sternum. Width of the opening, one inch.

Dr. A. M. Slocum (Trans. Coll. of Phys., Phila., 1860, III N. S., p. 310), describes a case of congenital fissure of the upper half of the sternum in case of a woman twenty-five years of age. Fissure filled up with a strong ligament and covered with the common integument. Vertical depth, three in.; ordinary width, one and a half in.

Professor Abbott (Mem. Soc. de Biologie, tome IV, 1 ser., p. 163) relates a case of absence of sternum in an adult negress, married, and the mother of three perfectly developed children.

Dr. Otto Obermeier (Virchow's Archiv. 1869, XLVI, pp. 209-217) says that several cases of bifid sternum are to be found in the literature known to him—few in adults—and gives valuable bibliography.

Prof. C. L. Ford writes that the Museum at Ann Arbor "contains a sternum with an opening in the middle, of small size, and another of less width."

Dr. Groux is supposed to have possessed the power to arrest the action of the heart at will. On taking two or three quick inspirations, by an effort the cardiac movements were apparently stopped. The writer once witnessed this experiment, though without opportunity for personal examination. The duration of the supposed arrest was about twenty seconds. The Doctor remarked that he had never deemed it prudent to prolong it beyond that time.

Some years ago Dr. Groux was examined at the Long Island College Hospital. Dr. J. H. Raymond, Professor of Physiology in that institution, writes: "The experiments of Dr. Groux were made while standing. The time during which the heart's action was arrested was very brief, but sufficiently long to satisfy several (medical gentlemen) of the

fact. I was myself convinced that he could voluntarily arrest the action of the heart, and I am still of that opinion."

Dr. S. G. Armor, Professor of the Practice of Medicine in the same college, says :

"While my ear was applied to the chest the heart ceased to beat. The time of suspended action was very short, and I was not satisfied as to the immediate cause. I am inclined to the opinion, however, that it was mechanical rather than mental. He claimed, I believe, that it was purely mental, the result of his volition. But the volitional act appeared to always immediately follow two or three deep inspirations. I have no reason to suppose that the Doctor himself attached any importance to the deep and forcible breathing, other than as security during the temporary suspension of the heart's action. But that the heart did cease to beat for a time, there cannot, I think, be any doubt.

Dr. Middleton Michel, Prof. Physiol. and Histol., Medical College of State of South Carolina, in a recent paper (Boston Medical and Surgical Journal, Oct. 31, 1878), describes the case of a negro, who, he says, could arrest the action of the heart at will. Prof. Michel had personally examined the negro and witnessed the experiment. He states that he had also examined "a Mr. Grew, in whom there was an arrest of development of the sternum." (The person meant is, undoubtedly, the subject of this report.) He testifies that, in the case of Mr. G., "there was temporarily no pulse throughout the system," and that "the experiment lasted almost two minutes." In the case of the negro, the act was not so prolonged.

In answer to inquiry as to the authenticity of alleged cases of voluntary control over the heart's action, Dr. Austin Flint, Jr., says: "I have never seen a report of a case that has been satisfactory to me."

In reply to a similar question, Prof. J. C. Dalton writes: "The impression which they give me is that there are none of them of any real value.

I suppose the earliest reported case of this kind is that about the year 420, by Saint Augustine, who speaks of a certain elder of the church in Calamo, named Restitutus, who could at will pass into a state of syncope or apparent death, and come out of it again. But Saint Augustine does not pretend to have seen the case himself, or even to have known the man. He only reports it as something which many of the brethren recollected (*quod plerique fratres memoriâ recentissimâ experti sunt.*)" The entire quotation is given in D. H. Tuke, M.D.: *Influence of the Mind upon the Body.* London, 1872, p. 345.

The case mentioned by Dr. Darwin (*Darwin's Zoönomia*, 1794, vol. I, p. 39), says Professor Dalton, is without satisfactory authority.

The performances of the East Indian Fakirs (Observations on Trance, James Braid, M.R.C.S., London and Edinburgh, 1850), who, weeks after burial, were exhumed alive, he shows to be "pure deceptions" comparable to the "tricks of the Davenport Brothers." Of the only recorded case that has been almost universally accepted as authentic, he says: "After all, the most authentic case of this kind is that of Col. Townshend, reported by Dr. Geo. Cheyne. This case has been frequently referred to, and is quoted in many medical works. It is often stated in such a way as to give the impression that it was of tolerably recent occurrence and well attested: that Col. Townshend was a man in the prime of life and in fair health, but having the power to stop the action of his heart at will, and that he was in the habit of doing this whenever he pleased, and of returning to his usual condition afterward. The facts were very different. The case happened nearly 150 years ago. Col. Townshend, when seen by Dr. Cheyne, was in the last stages of a chronic disease of the kidney. Early one morning he sent for the doctor and his assistants in order to ask them about an 'odd sensation' which he had felt, as he said, for 'some time.' Presumably this was during the previous twenty-four hours, or less, as he had been visited regularly by his medical attendants every day, and had said nothing about it before. The sensation in question was that he 'could die or expire when he pleased, and yet by an *effort* or somehow, he could come to life again.' This he tried before Dr. Cheyne, and actually became, to all appearance, dead, without pulsation or respiration, remaining so for half an hour, and then returning to consciousness. This was the only occasion on which Dr. Cheyne either saw the phenomenon or heard anything about it. It took place about nine o'clock in the morning, and Col. Townshend died on the evening of the same day; the autopsy being performed on the day following. This is the whole of the celebrated Townshend case. It is related in Dr. Cheyne's treatise on the *English Malady* or Nervous Diseases. London and Dublin, 1733, p. 209.

However, I do not think that any of these cases have much bearing on that of Dr. Groux. In all of them the subjects were supposed to induce in themselves, by voluntary effort, a state of trance, or cataleptic insensibility, in which all the functions of life were apparently suspended together.

With regard to Dr. Groux, as I understand it, it is claimed that he could, at any time, arrest the heart's action, without producing insensibility, unconsciousness, or any other disturbance of his usual condition, beside the stoppage of the circulation.

If true, this would be very different from any of the previous alleged cases. When Dr. Groux was examined, some years ago, by Dr. Peaslee,

Dr. Metcalfe and myself, we were not able to see that he did anything else than to stop the pulse at the left wrist, the circulation continuing everywhere else."

In their report, the Committee of the N. Y. Path. Soc. attributed the power to stop the pulse at the wrist to the unusual mobility of the clavicle, by which the subclavian artery was compressed at the top of the chest.

As bearing upon the question of ability to arrest the heart at will, I quote the following: "The heart may be stopped indirectly by a voluntary effort. This is effected first, by distending the lungs, stopping the mouth and nose, and making a strong ~~inspiratory~~ inspiratory effort; second, by partially emptying the lungs, stopping the mouth and nose, and making a strong inspiratory effort. These are dangerous experiments." (Physiology of the Circulation. J. B. Pettigrew, Lect. on Physiol., at Surgeon's Hall, Edinburgh.)

Prof. Michel attributes the arrest of the heart to voluntary suspension of respiration. (Boston Med. and Surg. Journal, Oct. 31, '78.)

In experiments upon animals the effect of suspending the respiration is as follows (Flint's Text Book of Physiology, p. 54): The obstruction to the circulation begins in the systemic capillaries, and is propagated back to the heart through the arteries. After about one minute the frequency of pulsation begins to diminish. Later the cavities of the heart become engorged with blood, its muscular fibres paralyzed, and (after perhaps four or five minutes) it ceases to beat. "It is in this manner," Dr. Michel declares, "that a temporary interruption to the circulation and heart's action is effected" in cases like that of Dr. Groux.

This theory is clearly untenable, for the following reasons:

I. In the examination of Dr. Groux, held at the Long Island Coll. Hospital, the arrest of the heart was *immediately* preceded by deep inspirations.

II. In suspended respiration consciousness and voluntary motion are abolished by dark blood in the cerebral capillaries before the stoppage of the heart.

III. When the action of the heart is once arrested by interrupting respiration, its irritability being exhausted and the nervous system narcotized by unaërated blood, the circulation is never restored. (Vide Works of Sir B. C. Brodie, vol. I, Effects of Strangulation.)

It has been suggested that possibly in the experiments of Dr. Groux, the cardiac movements were not arrested, but simply rendered inaudible by the protrusion of the lung into the fissure, and over the heart, during forced inspiration. But, were this possible, so good observers as the gentlemen who conducted the examination at the Long Island College Hospital could not have omitted to eliminate this source of error.

The method stated by Pettigrew, I assume, does not explain suspension of the cardiac movements for twenty seconds.

The subject of alleged ability to control the heart's action must be committed to the physiologists for further investigation.

The literature of fissured sternum not already given is chiefly embraced in the following

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