OBSERVATIONS

ON

ULCERATION OF THE JUGULAR VEINS,

COMMUNICATING WITH AN

ABSCESS OR AN OPEN SORE.

BY

S. W. GROSS, M.D.,

LECTURER ON DISEASES OF THE GENITO-URINARY ORGANS IN THE JEFFERSON MEDICAL COLLEGE, AND SURGEON TO THE PHILADELPHIA ORTHOPÆDIC HOSPITAL.

Extracted from the American Journal of the Medical Sciences for April, 1871.

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ULCERATION of the bloodvessels, as an effect of the extension to their coats of unhealthy inflammation from the surrounding tissues, is of comparatively rare occurrence, and of still greater infrequency is perforation of these vessels from inflammation commencing in their proper tunics. Since the publication of Mr. Liston's celebrated case of communication of the common carotid artery with the cavity of a chronic abscess,[1] a number of somewhat analogous instances of ulceration of arteries and veins in different portions of the body have been recorded, which clearly establish the fact that unopened abscesses, and abscesses which have undergone acute ulceration, whereby they are converted into spreading sores, as well as chronic abscesses which suddenly take on acute action, may expose and perforate bloodvessels. Of this lesion, referring to the arteries of the neck, in consequence of abscesses in their neighbourhood, or diffuse cellulitis, I may refer to the following examples, which I have casually noted in collecting the cases that form the subject of this paper: *Subclavian*, Mr. Jackson;[2] *Common Carotid*, Liston,[3] Spence,[4] Mackmurdo,[5] Hodgson and Hargrave,[6] and Else;[7] *Internal Carotid*, Crisp,[8] Hodgson and Hargrave,[9] and Nicholls;[10] *Inferior Thyroid*, Adolphus;[11] *Superior Thyroid*, Dolbeau[12] and Billroth;[13] *Lingual*, Fergusson;[14] and *Facial*, Arnott.[15]

Additional instances of cervical hemorrhage from the same causes,

[1] On a Variety of False Aneurism, Brit. and For. Med. Rev., vol. xv. p. 155, 1843.
[2] Lancet, 1848, vol. i. p. 157.
[3] Brit. and For. Med. Review, ut supra.
[4] Monthly Journal of Med. Sci., vol. xiv. p. 278, 1852.
[5] South's Chelius, vol. ii. p. 546, Philada., 1847.
[6] Lancet, vol. i. p. 866, 1841–2.
[7] Med. Obs. and Inquiries, 2d ed., vol. iii. p. 177, London, 1769.
[8] Diseases of the Bloodvessels, p. 282, London, 1847.
[9] Lancet, 1841–2, vol. i., ut supra. [10] St. George's Hosp. Rep., vol. iv. p. 211.
[11] Edinburgh Med. and Surg. Journ., vol lix. p. 104, 1843.
[12] Med. Times and Gazette, 1864, vol. i. p. 487.
[13] Genl. Surg. Path. and Ther., p. 531, New York, 1871.
[14] On a Variety of False Aneurism. By Robert Liston.
[15] Lond. and Edin. Monthly Journ. of Med. Sci., 1843, vol. iii. p. 946.

occurring generally in strumous children of cachectic habit, after an attack of scarlet fever or measles, in which the ulcerated vessels communicated with the fauces, or with an open or closed abscess, have been narrated by Liston, Syme, Hargrave, Snow, Carteaux, Storrs, Adams, Hughes, Mayo, Luke, Perry, and other observers. In none of these, however, was the precise vessel discovered, but in all, as well as in those previously mentioned, a fatal issue ensued, with the following exceptions: Those of Syme (1), Hargrave (2–3), Mayo (4), Luke (5), and Perry (6), saved by tying the common carotid;[1] that of Dolbeau, cured by ligating the external carotid;[2] and those of Liston (1), Snow (2), and Adolphus (3), successfully controlled by direct compression.[3]

The unsuccessful cases of ligation are those of Liston,[4] Syme,[5] and Mackmurdo,[6] of the common carotid, and of Hughes, of the internal carotid.[7]

A strumous abscess in the lower part of the neck has been known to excite ulceration of the arch of the aorta. An unusual case of this nature has been reported by Mr. Busk:—[8]

A woman, æt. thirty-five, had been affected with a glandular enlargement just above the sternum for fourteen years. This inflamed and suppurated, and about five months prior to Mr. Busk's attendance it was allowed to discharge itself spontaneously. A fistulous orifice remained in the median line near the episternal notch, which was the seat of a constant purulent discharge. A sudden arterial hemorrhage occurred from this opening, which was restrained by moderate pressure; and, on the following day, a recurrence of the bleeding was subdued by the same measure, when a considerable swelling, attended with diffuse pulsation, formed. The strength of the woman was, however, exhausted, and she expired about forty-eight hours from the commencement of the hemorrhage. Post-mortem inspection disclosed an immense, irregular cavity, occupying nearly the entire front of the neck below the thyroid cartilage, and extending down to the ascending aorta. This was filled by a pound of very offensive coagulum, and communicated with the arch of the aorta by a narrow rent, its coats having been thinned by ulcerative action set up from without, in consequence of which they were unable to withstand the impetus of the blood.

[1] (1) Lond. and Edin. Monthly Journ. of Med. Sci., 1843, vol. iii. p. 945. (2-3) Lancet, 1841-2, vol. i. p. 866, and Dublin Quar. Journ. of Med. Sci., 1849, vol. viii. p. 90. (4) Crisp, op. cit., p. 305. (5) Ibid. (6) Glasgow Med. Journ., vol. iv. p. 169, 1831.

[2] Medical Times and Gazette, 1864, vol. i. p. 157.

[3] (1) Practical Surgery, p. 183, London, 1846. (2) Lond. and Edin. Monthly Journal of Med. Sci., 1843, vol. iii. p. 386. (3) Edinburgh Med. and Surg. Journal, vol. lix. p. 104, 1843.

[4] Loc. cit. [5] Loc. cit.

[6] South's Chelius, vol. ii. p. 546, Phila., 1847.

[7] Reference mislaid; but the case was one of a child six years old, which had scarlatina, followed by an abscess that opened, and on the tenth day there was arterial bleeding. The internal carotid was tied, when the hemorrhage ceased, but the child sank, and expired on the fifth day after the operation.

[8] Medico-Chirurgical Transactions, vol. xxix. p. 297.

Erosion of the bloodvessels is by no means to be anticipated in cases of abscess or diffuse suppuration of the neck, as it is a law of the economy that they are strengthened by fibrinous deposits, through which they are enabled to resist gangrenous action. It is not an unusual occurrence to see obliterated and thickened veins running through collections of pus or mortified tissues; and I am of the opinion that they are not more liable to ulceration than the arteries, as has been somewhat loosely maintained. When inflammatory changes are going on in tissues around veins, it is found that, in addition to the protective lymph exuded on their exterior, a fibrinous coagulum is formed in their interior, by which they are firmly closed, so that when they do slough, hemorrhage is infrequent. The pressure of an abscess upon a vein is in itself often sufficient to cause obliteration of its cavity, whereas arteries appear to be more disposed to ulcerate. In a case of typho-malarial fever, occurring in a coloured soldier that came under my observation in the Department of the South, during the late war, the connective tissue of the neck was extensively gangrenous. In giving vent to the pus by a large incision, I divided the external jugular vein, but not a single drop of blood escaped, as it had become occluded by pressure. On the other hand, Mr. Spence[1] exhibited to the Edinburgh Medico-Chirurgical Society a specimen of cervical abscess, in which the great vessels and nerves below the angle of the jaw had been laid bare, and the connective tissue completely developed. The common and internal carotid arteries were eroded, and communicated with the abscess, but the cavity of the internal jugular vein was obliterated.

Having had the fortune to meet with an example of fatal hemorrhage from perforation of the internal jugular vein, in consequence of diffuse or gangrenous cellulitis after an attack of scarlatina, I have thought that the publication of its details, with abstracts of other instances of ulceration of the large venous trunks of the neck, would be not without interest, since no attempt appears to have hitherto been made to collect and analyze the recorded cases of this extremely rare lesion.

Case I.—While visiting, October 3, 1866, a patient who was the subject of acute phthisis pulmonalis, a woman from the neighbourhood came into the house and requested me to look at her child, a boy æt. 21 months. I found a soft diffuse swelling on the right side of the neck, below the angle and body of the lower jaw, and, as it was on the point of bursting, with a bistoury I made an incision half an inch long, which was followed by the escape of about an ounce of fetid, thin, puriform fluid, containing shreds of dead connective tissue. The boy was much emaciated, very pale, and irritable, and the mother informed me that he had been the subject of scarlatina, and that the swelling made its appearance near the angle of the jaw, at about the end of the second week from the date of the eruption, so that it had existed, as nearly as I could discover, five days before I opened it. I directed the application of flaxseed poultices, and ordered

[1] Monthly Journal of Med. Sci., vol. xiv. p. 278.

five drops of the tincture of the chloride of iron with one grain of sulphate of quinia every six hours, along with a little whiskey in the form of milk-punch. I also endeavoured to impress upon the mother the importance of giving the child the benefit of a purer air, but my advice was not followed.

I heard nothing more of the case until the fourth morning after this, when, while visiting my regular patient, I was told that the child had bled to death in its crib about five hours previously. I immediately sought the woman, who informed me that on going to change the poultice, she found that the child was dead, and that the poultice, pillow, and dress were covered with blood. After much persuasion, I was permitted to lay open the parts. The opening that I had made to evacuate the abscess had enlarged to about five inches in circumference. The connective tissue from the upper boundary of the neck nearly to the clavicle was completely destroyed; the structures in the upper limits of the great anterior triangle laid bare; and blood, partly fluid, partly coagulated, was effused into the lateral and anterior cervical regions. The anterior wall of the internal jugular vein presented an irregular, ovoidal opening, about six lines in length and two in width, the lower border of the ulcer being situated a little above a point opposite the origin of the external carotid artery. There were no inflammatory appearances about the margins of the perforation; the lining membrane of the vein was perfectly smooth and glossy; but, throughout the small extent that I was allowed to examine, the external tunics were thick and dense, and the vessel was empty. The carotid artery was not diseased.

The foregoing case, although not so perfect in its details as I would desire, affords an excellent illustration of destruction of the coats of a large vein from diffuse cellular inflammation, occurring in an enfeebled subject after a severe attack of scarlatina. There was no evidence of any connection of the lesion with the strumous diathesis; the sudden death from hemorrhage was unavoidable, and I am not aware that any measures could have warded off so unexpected a termination. Had I suspected, however, the possibility of such an event, I would have laid open the cavity freely, and dressed the parts with compresses wet with a solution of the chloride of zinc, with a view to arrest the gangrenous action, and excite the granulating process.

There are on record not less than eleven additional examples of ulceration of the internal jugular vein, and one of the external jugular vein, with hemorrhage into the sacs of closed abscesses, or into abscesses several days after their contents had been evacuated, or into acute or chronic ulcers. The majority of these occurred in children in connection with grave forms of scarlet fever, while others were due to the extension of inflammation to the walls of the vessels from scrofulous sores or abscesses. Assuming that the readers of this journal are not familiar with all of the cases of this unusual and interesting lesion, abstracts of each are subjoined, from which their nature, progress, treatment, and morbid appearances can readily be appreciated and compared. It will be noticed that they are all examples of perforation of the jugulars, which will account

for the title of this paper, and if there be a recorded instance of a similar lesion of the subclavian, or of the smaller veins, I have been unable, after careful search, to find it.[1]

Case II.—October 20, 1842, Mr. Bloxam[2] was requested to visit a girl, æt. 5, who had been under the care of a medical gentleman for three weeks previously, with an attack of scarlet fever. On the decline of the eruption, a lymphatic gland under the angle of the right jaw inflamed and suppurated freely. An abscess had opened itself externally for five days, when a slight venous hemorrhage, which gradually became copious, took place from the aperture. Three days after the first appearance of the blood, Mr. Bloxam saw the case.

The girl was almost exsanguine; the hemorrhage was aggravated by coughing or moving; and, being of a very irritable temper, every time she was excited the flow of blood was copious. The abscess was plugged with lint, and a graduated compress and roller applied, with the effect of restraining the bleeding. This, however, recurred in twelve hours, from the great restlessness of the patient; and, although the compresses were several times readjusted, she was so irritable that they were almost immediately displaced. This state of affairs continued from time to time until her death, on the fifth day from the commencement of the hemorrhage.

Autopsy.—An immense quantity of semi-coagulated blood was effused beneath the integuments of the throat and forepart of the chest. An oblong ulcer, of five lines in extent, was found in the inner wall of the internal jugular vein, opening immediately into the cavity of the abscess.

Mr. King,[3] of Glasgow, has reported the following case, which presents many points of interest, in addition to the great difficulties in arresting the hemorrhage. At the risk of being deemed prolix, I shall transfer it almost entire.

Case III.—In consultation with Mr. Brown, on the 13th of November, 1842, Mr. King saw a boy, æt. 4 years, who was stout, and had previously enjoyed excellent health, but who had been seized sixteen days before with pyrexial symptoms, followed by the eruption of scarlet fever, which disappeared in a few hours without any obvious cause. On the second day a diffuse swelling appeared on the right side of the neck, below the lobe of the ear, which impeded deglutition and respiration, and provoked an incessant tickling cough.

For some days the swelling remained stationary; but, after the application of poultices, it pointed and burst, three days before Mr. King's visit, leaving an opening into which a No. 8 catheter could be introduced. A quantity of pus was discharged, and everything seemed to have proceeded favourably until five minutes before "our arrival, when the girl who was holding him observed blood running down his breast from underneath the dressings, and, on removing them to ascertain whence it proceeded, two jets were propelled forcibly upon her face and cap."

On removing the cloths, blood was seen still flowing in a free stream from

[1] As this article was passing through the press the author found that Dr. Payne had exhibited to the Pathological Society of London, at its meeting January 17, 1871, a specimen of communication between the right innominate vein and an obsolete scrofulous abscess, which he believed had given rise to the pyæmic symptoms under which the patient had laboured during life.—*Med. Times and Gaz.*, Feb. 4, 1871.

[2] Med.-Chir. Trans., vol. xxvi. p. 112. London, 1843.

[3] Lond. and Edin. Monthly Journ., 1843, vol. iii. p. 177; also Am. Journ. of Med. Sci., 1843, N. S., vol. vi. p. 216.

the opening; the abscess was very tense, and about the size of a hen's egg, and it occasioned considerable dyspnœa and severe paroxysmal coughing, during which it became very firm and prominent from regurgitation. The tumour was not affected by pressure on the carotid, but direct pressure on its walls at once brought on a fit of coughing without displacing its contents. A compress and bandage were applied, to give support and to favour coagulation, but firm pressure could not be brought to bear on the tumour, on account of impeding respiration and provoking coughing. During the afternoon the bleeding recurred, thereby rendering additional compresses necessary.

At noon, on the following day, the tumour had increased in every direction, and the skin had become much attenuated. At seven o'clock the swelling had still further increased, and had produced so much dyspnœa that it had been found necessary to loosen the bandages a little. It was now agreed to change the dressings. "When the bandages were partly removed, the child was seized with a paroxysm of coughing, during which the anterior wall gave way to the extent of two square inches. A thin coagulum, about the size and thickness of a crown piece, was ejected, followed by an immense gush of blood. I instantly introduced the first two fingers of my right hand into the opening, and surrounded the fingers and the tumour with cloths, and very little blood was afterwards lost, although my fingers could not get either to the upper or lower orifices, in consequence of the lower part of the tumour being covered by the parotid gland and sterno-cleido-mastoid muscle. When my fingers were first pressed into the abscess, I felt blood flow freely downwards from above, and propelled upwards with great force during each forcible expiration. A state of syncope followed in a few seconds, and he expired shortly afterwards."

Autopsy.—"The tumour, to a certain extent, had been divided into two sacs, which communicated very freely. The one extended below the digastric muscle and parotid gland to the base of the skull, the other having the parotid gland for its posterior wall, the sterno-cleido-mastoid for its external, the platysma, fasciæ, and skin for its anterior." Nine-tenths of an inch of the external wall of the internal jugular vein, commencing two lines below the base of the skull, and extending downwards, was completely removed as if by a sharp scalpel. The internal wall, and even the margins of the opening, were perfectly healthy, and of the normal pearly-white colour. The walls of the abscess were examined in every direction, and found to be healthy; and an incision, two lines in depth at any point, displayed the surrounding structures in a natural state. The carotid artery and parotid gland were healthy.

Case IV.—Dr. De Bal,[1] of Sweweghem, attended "a girl, æt. 12, who was affected with swelling of the neck, most marked at the left side, the consequence of scarlatina, which had run its course favourably. An indistinct sense of fluctuation being perceptible, the abscess was opened by the lancet, which gave exit to a large quantity of pus and serum. On the seventh day afterwards, when everything seemed to progress favourably, there took place a copious hemorrhage from the abscess. The patient having fainted, the bleeding ceased; but this returned in the evening, and was succeeded by almost immediate death. On examination, the tumour appeared to be the size of a man's closed hand; and, being cut into, it was found that the suppuration had destroyed a part of the internal jugular vein to the extent of a finger's breadth."

Mr. Robert W. Smith[2] narrated to the Pathological Society of Dublin a case of perforation of the internal jugular vein after scarlatina, which presents the peculiarity of having been fatal from the combined effects of hemorrhage and acute pyæmia.

[1] Journ. des Connaiss. Méd.-Chir., Oct. 1845, and Dublin Quarterly Journ. of Med. Sci., N. S., vol. i. p. 553, 1846.

[2] Dublin Quarterly Journ. of Med. Sci., vol. i., N. S., p. 505.

Case V.—A boy, æt. 9, was admitted into the Hardwicke Hospital on the 5th of August, with scarlatina. In two days the throat symptoms were well marked, and on the 12th the parotid regions were suddenly attacked with swellings, which extended down the neck, and were hard and tense; and the integuments were inflamed. On the 15th the swelling on the left side had almost subsided, but that on the right side was soft, pale, and colourless. It was opened, and discharged a quantity of thin, unhealthy pus. On the following day another puncture was made near the chin, and his strength was giving way under the profuse discharge. Upon the 18th he had a frequent, short cough, with scanty expectoration and short, hurried breathing; countenance pale and most anxious; pulse faint and rapid. 20th. Diarrhœa. To-day a sudden gush of thin watery-looking blood took place from one of the openings in the neck; about four ounces of blood flowed, and then the discharge suddenly ceased. On the 22d a pale, colourless swelling, with fluctuation, suddenly appeared in the calf of the right leg, and the foot became œdematous. Upon the 23d the right knee-joint became distended with matter, but the boy did not complain of any pain. On the following day there was another gush of blood, and death ensued shortly afterwards.

Autopsy.—The integuments of the right side of the neck were of a dusky colour, undermined, and perforated by a number of small holes. The cellular tissue and upper part of the sterno-cleido-mastoid muscle were in a state of slough, and infiltrated with a thin, fetid, sanious, purulent matter. Near the angle of the jaw, the internal jugular vein presented a small circular opening; "the lining membrane of the vein around the aperture was covered with green lymph, and this again was surrounded by a number of red vessels." The right tonsil was completely destroyed; the epiglottis presented the various stages of inflammation from increased vascularity to ulceration, and the mucous membrane of the larynx was also inflamed. Both lungs were the seat of broncho-pneumonia, with great congestion; but the disease had nowhere advanced to purulent infiltration. "The right knee-joint was distended with purulent matter, and the cartilages were soft but not ulcerated. The muscles of the calf of the leg were infiltrated, and separated from each other by purulent matter; the foot was œdematous, and the ankle-joint contained pus."

Case VI.—Dr. David[1] has recorded the following case: "I was requested, on the 10th of December, to see a little boy, six years old, confined to his bed with scarlet fever. The symptoms were severe, and continued so for a fortnight; a change then took place; his health daily improved; sitting up and taking light nourishing diet. At this period I noticed a swelling in his neck, which he complained of being very painful on pressure. Liniments, fomentations, and poultices were applied, but it daily increased in size, and eventually came to a point. An opening was made, and about four ounces of the most fetid matter discharged; the orifice increased in size, being ragged and of a deep blue appearance, exposing the jugular vein more than an inch; the coats appeared black, livid, and unhealthy. I cautioned the parents not to let the child be left alone, and gave them my reason. My orders were attended to, but unfortunately, while the nurse was sleeping, early in the morning, the coats of the vein gave way, profuse hemorrhage took place, and upon the mother entering the room, she found her child dead, deluged in blood, and the nurse comfortably asleep."

Case VII.—A girl, five years of age, was admitted into the London Hospital with an extensive ulcer of the left side of the neck, extending from the ramus of the jaw to the clavicle, part of the latter being in a state of exfoliation. Of this case, Mr. Barret[2] remarked to the London Hospital Medical Society: "The sloughing was the sequela of scarlatina. She appeared almost anæmic, hemorrhage having occurred on two or three occasions prior to her admission. Upon removing the lint and bandages which had been applied by a surgeon in the neighbourhood, an unhealthy, indolent sore was seen, which had penetrated to some depth below the anterior border of the sterno-cleido-mastoid muscle,

[1] Lancet, 1847, vol. i. p. 241.

[2] Lancet, 1847, vol. i. p. 287.

the remainder of which muscle was completely exposed. At the upper part was seen the parotid gland, through which sinuses seemed to pass, and in one of these was a small clot. The edge of the thyroid body bounded the ulcer in the median line. Lint, moistened with a hot solution of chloride of calcium, was applied over the ulcer; tonics and nourishing food were administered.

"On the following day the ulcer appeared more healthy. Hemorrhage, however, came on from its upper part, and was checked by pressure. On the third day copious bleeding came on at two distinct periods, and the child sank. On dissecting in the course of the carotid vessels, the sheath of the external carotid was found to have been opened by an ulcer in the substance of the parotid gland, and had extended into the internal jugular vein, causing a perforation four lines in length by three in width. The margin of the opening was smooth, and analogous to a perforating ulcer in the intestine."

Case VIII.—Dr. Murchison[1] exhibited to the Pathological Society of London a specimen of ulceration of the internal jugular vein into an abscess of the neck, obtained from a boy eight years of age, who was the subject of scarlet fever. "Towards the close of the fever an abscess formed in the right side of the neck about the angle of the jaw. On the abscess being opened a large amount of sanious pus was discharged, and the discharge continued for three or four days. A swelling then formed about the same site, which burst and discharged blood and serum. It again formed next day and burst in the same way. This occurred two or three times, and the boy then died about the third or fourth day."

Autopsy.—"A large clot was found lying in the cavity, caused by the bursting of the swelling, and all the parts under the jaw, and at the upper part of the anterior triangle of the neck, were found laid bare, as if for anatomical examination. A large portion of the parotid gland was found lying almost bare in this cavity. A small aperture about the size of a pea, with irregular edges, was found in the internal jugular vein, just above the lower border of the parotid gland, and about half an inch higher up and behind the gland another opening in the vein was found in the form of a slit about half an inch in length. Several lymphatic glands in a state of suppuration were found along the course of the vein."

Case IX.—A child, æt. 4½ years, of scrofulous and delicate habit, was attacked with scarlet fever on the 19th of August, 1851. Mr. Sedgwick[2] describes the fever to have been severe, and attended with swelling on each side of the throat, that on the right side being the larger. The latter continued to increase, and fluctuation was detected on the 1st of September. Two days subsequently, a small incision made into it gave vent to about one ounce of pale, straw-coloured pus, which was immediately followed by a discharge of dark blood. The hemorrhage was controlled by adhesive strips and a compress secured by a bandage; but, in the evening, the bleeding returned, for which new dressings were firmly applied. The hemorrhage recurred twice afterwards, at intervals of two and three hours respectively; and on the last occasion a narrow strip of lint, steeped in the tincture of the chloride of iron was passed into the cavity of the abscess, and the dressings were applied as before. On the afternoon of the same day, the 4th inst., there was no external appearance of blood, but it was evident that the cavity of the abscess was becoming filled and distended. The child was much exhausted, and large collections of pus had formed on the left side of the neck below the angle of the jaw, as well as over the left clavicle at its acromial side.

On the 5th inst., as there was much distension, Mr. Sedgwick determined to lay the parts open, with a view of determining the source of the hemorrhage, and of arresting it, if possible to do so. He accordingly at 1 P. M. made an incision, upwards of an inch long, into the sac, and removed about four ounces of dark fluid blood mixed with coagula; but the hemorrhage at once became so violent that he required the assistance of a friend to press back firmly the walls

[1] Trans. of the Path. Soc. of London, vol. x. p. 99, 1859.
[2] London Medical Gazette, N. S., vol. xiii. p. 581, 1851.

of the cavity for the purpose of closing the bleeding orifice. In this he was successful. Firm pressure was then made on the part by compresses; but the blood continued slowly to fill the cavity, and the child died at 9 P. M., there having been but slight external oozing.

The post-mortem inspection showed a cavity of very large extent, the digastric and stylo-hyoid muscles, with the main vessels and other structures, being in great part dissected out by the gangrenous process. A diseased gland of large size lay free in this cavity; and an opening, of an oval form, with ragged edges, and about four lines in length, was discovered in the internal jugular vein.

The preceding nine cases are examples of ulcers of the internal jugular vein from inflammatory action extending to its walls, communicating with closed or open abscesses or ulcers, and occurring in children after an attack of scarlet fever. The following instance relates to the external jugular vein, in connection with the same disease, and it presents the interesting feature of being an example of hemorrhage into the cavity of a closed abscess, the blood flowing immediately upon an incision being carried into it. In this respect it resembles the ninth case, or that of Mr. Sedgwick; and differs only from the "variety of false aneurism" of Mr. Liston, in that the sac of the abscess contained venous, and not arterial blood.

Case X.—Under the care of Dr. Hoffman.[1] "A child, æt. 5 years, on recovering from scarlatina, suffered an attack of inflammation and swelling in a cluster of subcutaneous glands situated on the right side of the neck. The glands suppurated, and fluctuation became distinct. A certain tremour, which was perceptible by the hand, and noise, which could be heard by the ear applied to the abscess, were held suspicious symptoms, and much hesitation was therefore felt in puncturing the tumour; in fact, this was not done until after a consultation held with a regimental surgeon, who approved of the measure. The abscess was punctured, but immediately an ample stream of blood revealed the true nature of the mischief. The blood at first had a dirty red colour, undoubtedly from the admixture of pus; but before it could be arrested it appeared quite pure. The puncture was closed forthwith, and gentle pressure maintained by means of a bandage; but this was scarcely secured when the patient expired."

"On examination after death, it was found that the external jugular vein was perforated like a sieve in a space three-quarters of an inch in length, and that the parts of the vessel above and below this portion were discoloured and soft. The abscess, which was regarded as metastatic in its nature, had, in fact, extended to the walls of the vein which lay over it, and perforated them."

Such are the histories of the cases of erosion of the jugular veins from diffuse cellular inflammation after scarlatina, without there having been any necessary connection with the strumous diathesis. The succeeding two cases of fatal hemorrhage were due, on the other hand, to the extension of the morbid action from open scrofulous abscesses or ulcers to the walls of the internal jugular vein; and they differ from the preceding group in having run a chronic course, and occurred in adult subjects.

Case XI.—Mr. Alford[2] communicated to Mr. Liston the case of a woman, æt. 32, of scrofulous temperament and intemperate habits, who had, a little below the

[1] Lond. and Edin. Monthly Journal of Med. Sci., 1844, vol. iv. p. 632.
[2] Practical Surgery, by Robert Liston, 4th ed., p. 183. London, 1846.

middle of the neck, "an ulcer external to the left sterno-cleido-mastoid muscle, one inch and a half long, extending from above downwards, three-quarters of an inch wide, and full one inch deep, extending inwards behind the muscle." Another sinuous ulcer was situated over the sternum. She had severe cough, and great dyspnœa, attended with excited circulation; and stated that about one month previously, the abscesses, which had been in the process of formation about three months, burst. There had been severe hemorrhage during the night previous to Mr. Alford's seeing her, but, as a precautionary measure, compresses soaked in an alum and zinc lotion were applied to the ulcer, and retained by a roller.

On the 16th of April—the duration of the interval not being mentioned, but there had been occasional slight hemorrhage induced by violent coughing—while dressing her neck, there was slight bleeding, followed by a gurgling sound with a frothy appearance of the blood at the bottom of the ulcer, which induced an alarming syncope, from which she gradually recovered under the use of stimulants. A membranous opening was perceived at this time, near the upper extremity of the ulcer. The cough and difficulty of breathing increased, the expectoration became profuse, and the dressings were occasionally stained with blood. On the 16th of May, or upwards of one month from the first appearance of the bleeding, "while dressing her neck, a fit of coughing came on, which was followed by a sudden gush of blood in a stream as large as my little finger from the ulcers, forcing out the plug which I was just about to remove. There were not more than six ounces of blood, at the outside, lost, as I at once arrested the bleeding by pressing with the fingers of my left hand along the inner edge of the sterno-mastoid muscle, while the thumb was applied to the outer edge of the ulcer; but fatal syncope gradually came on, and, though stimulants occasioned a transient hope, she again, in a few minutes, became pulseless and died."

A post-mortem examination revealed an ulcer about six lines long, and two wide, in the anterior wall of the internal jugular vein. On the right side of the chest there were old and firm pleural adhesions, and there were three large irregular cavities in the upper and middle lobes of the lung. There was also a cavity in the upper lobe of the left lung, and an abscess in the right kidney.

Case XII.—Dr. Michaelis saw,[1] in one of the London Hospitals, a woman who had a swelling as large as a hen's egg on the right side of the neck, in which pulsation and fluctuation were very evident. It could not be determined, however, whether the fluid was blood or pus, or whether the pulsation was resident in the tumour, or merely transmitted to it by the carotid artery. A fly-blister was applied, and, contrary to all expectation, it disappeared. The patient returned at the expiration of two months, when the swelling was as large as the two fists, but it was not affected, on this occasion, by vesication. Under the supposition that it was an abscess, warm dressings were applied, and, when the integuments had become thinned, it was punctured, with the effect of giving vent to a fluid unlike clear serum (nichts als klares blutwasser), after which its walls collapsed. On the evening of the second day after its evacuation a fatal hemorrhage occurred; and on post-mortem inspection, the internal jugular vein was found to be dilated into a large sac, which had given way at one point.

The foregoing unusual illustration of varix of the internal jugular vein is probably the same as that mentioned by Mr. Hodgson,[2] who says: "Mr. Cline described in his lectures the case of a woman who had a large pulsating tumour in her neck, which burst and proved fatal by hemorrhage. A

[1] Richter's Chirurgische Bibliothek, vol. v. p. 120, 1789.

[2] A Treatise on the Diseases of Arteries and Veins, p. 539. London, 1815.

sac proceeded from the internal jugular vein. The carotid artery was lodged in a groove at the posterior part of this sac."[1]

The following case has not been included in either of the foregoing groups, as its history is too imperfect. It is peculiar, however, from the fact that the mixed contents of the abscess were discharged into the œsophagus, and that the vein was occluded below the point of ulceration by a limiting thrombus.

Case XIII.—Mr. Travers, in his essay *On Wounds and Ligatures of Veins*, says: "I have lately seen an instance of obliterated internal jugular vein, by the pressure of a tumour situated deeply on the right side of the trachea, and covering the great vessels. The patient, who was attended and examined after death by Mr. Kingdon, Surgeon, of Finsbury Place, had of late discharged pus and blood, both by the mouth and by the rectum. The tumour was found upon dissection to contain dead cellular substance, and a quantity of blood in a state of putrefaction. The internal jugular vein was filled for some space by a coagulum of blood, but an ulcerated orifice of communication with the cyst of the tumour appeared above the coagulum, so that the blood returning from the head passed in part into the cyst. There was also an ulcerated aperture of communication between the cyst and the œsophagus, and thus the contents of the tumour were, from time to time, passing into the alimentary canal. The artery and par vagum were sound, but the former was curiously defended by a covering of lymph."[2]

[1] Haller alludes to a death from spontaneous rupture of a dilated internal jugular vein, *Physiologia*, Lib. Sec., p. 245, 1778; and Puchelt has reported a similar case. *Handb. der Allg. und Spec. Chirurgie*, Band. ii. p. 104; Erlangen, 1865. Dr. Dzondi met with a varicose dilatation of the same vessel, as large as a hen's egg. *Lehrbuch der Chirurgie*, p. 395; Halle, 1824. Mr. Allan Burns had a cast from Dr. Munro, of an internal jugular, which was dilated into a considerable sized pouch, just below and behind the angle of the jaw. *The Surg. Anat. of the Head and Neck*, Amer. ed., p. 303, 1823; and Mr. Callender states that there is a specimen of the same nature in the museum of St. Thomas's Hospital, *Holmes's System of Surgery*, vol. iii. p. 309.

Mr. Bransby Cooper says: "The internal jugular vein is sometimes subject to dilatation, so that the swelling presents itself in the carotid sulcus, and, indeed, may offer considerable difficulty to the surgeon to distinguish it from disease of the carotid artery itself, as, from the vicinity of the swelling to that vessel, it more or less partakes of its pulsating nature. A patient was admitted into the London Hospital, with a swelling about the size of an egg on the right side of the neck, which was at first suspected to be carotid aneurism. Upon further examination, however, it was believed, from the softness of the tumour, the facility with which it was emptied, and the slight pulsation which it afforded, and that, not being quite synchronous with the action of the heart, that it was disease of the vein, and not of the artery. The absence of *bruit de soufflet* also tended to confirm this view. The patient died a short time after, of disease of the lungs, and the diagnosis was found to be correct." *London Medical Gazette*, 1848, N. S., vol. vii. p. 93.

With these exceptions, I am not aware of any example of uncomplicated varicose enlargement of the vessel in question.

[2] Cooper's and Travers's Surgical Essays, part i., p. 257. London, 1818, and Philadelphia, 1821.

Ulceration of the jugular veins appears, from an inspection of the preceding cases, to attack the two sexes with equal frequency, and to be eminently a lesion of early life, since ten of the twelve, in which the age is noted, occurred between the second and thirteenth year, the average being the sixth year, while in the remaining two the patient had attained the age of maturity.

The efficient cause of the destruction of the coats of the vessels was, in eleven instances, diffuse cellulitis following their course; and that disorder must be regarded, in at least ten of the cases, as one of the secondary expressions of the morbid poison of scarlatina, developed immediately after its termination, or during convalescence from it. Acute gangrene of the connective tissue, or diffuse cellulitis, differs from the cellulitis of phlegmonous erysipelas, in that the connective tissue is the original seat of the trouble, while the skin is either not involved at all or only secondarily so, after its vascular supply has been weakened by the destruction of the former. It never occurs in persons in even tolerable health, but is most often observed in children and young adults convalescing from diseases induced by specific organic poisons; as, for example, rubeola and scarlatina, but particularly the malignant variety of the latter affection. In such subjects it is developed out of an enfeebled condition of the system and a vitiated state of the blood, or a constitutional condition of general bad health, closely allied to, if not identical with, a state of septicæmia. It is ushered in either with mild febrile symptoms or with decided adynamic signs. A swelling soon commences, generally at the angle of the jaw, which rapidly extends from the parotid region down the side of the neck, it may be, as far as the clavicle. At first soft and œdematous or boggy, it soon becomes peculiarly hard and uneven; but the skin remains smooth, mobile, and tolerant of manipulation, and is neither hot nor red, although it may have a glazed appearance. In a few days the exudation appears to have ceased, and, under renewed exacerbations of fever, which now assumes a nervous, typhoid, or pyæmic type, one or more points of fluctuation appear, and the skin becomes thinner and of a dusky red hue. Simultaneously with the breaking down of the exudation, the connective tissue is destroyed, and the skin becomes secondarily gangrenous, sloughs, and gives vent to fetid purulent fluid and shreds of dead membrane.

This affection is very fatal to children, from complete exhaustion, septicæmia, pyæmia, or hemorrhage from ulcerated vessels. If the local trouble be permitted to go on unchecked, all the surrounding structures—muscles, aponeuroses, intermuscular septa, tendons, the bloodvessels and their sheaths—may be destroyed, and hemorrhage from perforation of the jugular veins may be looked for within the first week after the so-called resulting abscess has been evacuated surgically or spontaneously. In two of the cases the bleeding was immediate; in one it was deferred until the seventh day, but the average date of its appearance was the fifth day. After

hemorrhage has once occurred, investigation of the preceding cases shows that a fatal result may be anticipated. In three instances it was immediate, two of the children having been found dead in their beds; one was fatal in a few hours, while in six other cases in which the date is recorded, it varied from thirty hours to the fifth day after the first hemorrhage, the average being the third day, and then from repeated recurrence of the loss of blood.

Three distinct pathological processes are probably included in the perforation of the vein. In Case VI. the vessel appears to have been affected with limited necrosis, from the cutting off of its vascular supply, an eschar of upwards of an inch in extent having plainly been visible before the fatal termination. In Case XII. the enlarged and softened internal jugular gave way from the withdrawal of the contents of the overlying abscess, through which it lost its support. In all of the remaining instances the ulceration was due to progressive inflammatory changes, or diffuse (suppurative) phlebitis. It is interesting to note that in only two of the entire number was there thrombosis of the affected vessel. In Case XIII. the coagulum was of a limiting nature; while in Case V., in which death was due to the combined effects of hemorrhage and pyæmia, the affection of the neck had excited thrombosis of the internal jugular vein, and through retrograde changes of the thrombus, secondary obstructions and metastatic deposits. To use the language of Virchow: "These cases show that an abscess may burst through the walls of a vein without intravasation of its contents into the vessel, and that an extravasation of blood is more apt to follow than the establishment of a persistent pyæmia."

The appearance of the ulcer is noted in eleven instances. In Case X. the external jugular vein was "perforated like a sieve, in a space three-quarters of an inch in extent." In Case VIII. there were two openings in the internal jugular vein, one of about the size of a pea, and a second in the form of a slit half an inch in length. In all of the remaining cases the ulcer was single. In two it was circular in shape, while in the others it was of an oblong or ovoidal form, and varied from four to twelve lines in length. In Case V., in which there was intercurrent pyæmia, there was a small circular opening, and "the lining membrane of the vein, around the aperture, was covered with green lymph, and this again was surrounded by a number of red vessels." With this exception, there were no inflammatory appearances about the margins of the opening, nor of the internal coat of the vessel. In only two cases were the edges of the ulcer irregular or ragged. In the remainder it appeared as if the walls of the vein had been removed by a sharp scalpel.

Although these cases presented certain points in common, yet several were attended with peculiar features, which are worthy of notice. In only two (Cases IX. and X.) did the contents of the vein communicate with a closed abscess, and blood flowed at once upon an incision being made into

it. It is scarcely possible to diagnose the presence of venous blood in the sac of an abscess during life, and, in this respect, such swellings differ from those containing arterial blood. In Cases X. and XII. there were, however, some suspicious symptoms. In the former there existed a "certain tremour, which was perceptible by the hand, and noise which could be heard by the ear;" while, in the latter, pulsation was very evident, and it could not be determined whether it was resident in the tumour or merely transmitted to it by the carotid artery. In both cases there were no signs pointing to the presence of venous blood, but a careless examination might have given rise to the supposition of aneurism. Circumscribed effusions of venous blood into the connective tissue of different regions of the body have been mistaken for aneurism by experienced surgeons, two instructive cases of which occurrence are appended in the foot-note,[1] and Case X. only needed pulsation to have rendered the diagnosis embarrassing.

As in the case with wound of the internal jugular vein, as I have shown elsewhere,[2] the introduction of air into the circulation, through the perforated vessel, might naturally be expected; but that accident was only met with in Case XI., in which the anterior wall of the vein had been destroyed to the extent of six lines. One month prior to the death of the patient, "while dressing her neck, there was slight bleeding, followed by a gurgling sound, with a frothy appearance of blood at the bottom of the ulcer, which induced alarming syncope, from which she gradually recovered under the use of stimulants."

[1] Dr. Michaelis saw in the practice of Mr. Pott, of London, a man who was affected with a pulsating tumour at the lower and inner side of the thigh, caused by a violent strain. Mr. Pott thought it an aneurism, and had applied a tourniquet, preliminary to amputation, when he punctured the swelling to observe its nature. He found that it depended upon a ruptured varicose femoral vein, and that the blood lay in a sac formed by condensed connective tissue, with which the vessel communicated, and received an impulse from the femoral artery. The blood was evacuated, and the vein tied; but the patient died of exhaustion consequent upon profuse suppuration.—*Richter's Chirurgische Bibliothek*, B. v. p. 121, 1789.

Mr. Else has narrated the case of a man, twenty-five years of age, who had a swelling in the ham. "He said that it came after his endeavouring to raise a considerable weight, and that he felt a crack where the swelling appeared, as if something had been broken. Some time in December, 1764, this tumour was opened, and, a large quantity of fluid and clotted blood being discharged, it was judged to be an aneurism of the popliteal artery. The limb was instantly amputated, and immediately carried to the anatomical theatre," where it was injected, and the arteries were found to be healthy throughout. "The largest internal vein" was ruptured just above a pair of valves, the opening being irregular and connected with the tumour.—*Medical Observations and Inquiries*, 2d ed., vol. iii. p. 174. London, 1769.

[2] American Journal of the Medical Sciences, Jan. 1867, p. 38.

The practical lessons to be deduced from the study of the facts contained in this paper are—

First, that acute, destructive inflammation of the tissues of the neck, and deeply seated abscess, which has existed for some time, and suddenly takes on acute action, may, if unchecked in their progress, lay bare and perforate bloodvessels, and that this result is to be feared more particularly when diffuse cellulitis follows grave forms of scarlatina, or other acute specific diseases.

Secondly, that scrofulous abscesses and ulcers are not always indolent, but may under favourable circumstances, that is, in an enfeebled, broken-down condition of the system, rapidly assume phagedenic action, and lead to the same complication; and—

Thirdly, that the large arterial and venous trunks are more liable to be involved than their branches.

It behooves the practitioner, therefore, to be on his guard, in order that he may direct his measures to prevent the accident, and to arrest hemorrhage when the vessel has been perforated. To fulfil the first indication, an attempt should be made to cut short, or abort, the diffuse cellulitis during the first stage, or that of exudation. For this purpose, incisions should be made through the integuments, or be carried through the deep aponeurosis, if the disease be recognized to be seated below it. They should be as numerous as the necessities of each individual case demand, and be about one inch long, and separated an inch and a half from each other. Made in this way, they give vent to blood and serosity, thereby relieving tension, and are not so liable to be followed by as much loss of blood as when one or two large incisions are practised. Care must, however, be taken to arrest hemorrhage by light and equable compression, which will also exercise a good purpose by affording support to the affected structures.

During the stage of suppuration or mortification, incisions are imperatively demanded to afford a free outlet for the escape of pus and broken-down tissues, after which it is important to endeavour to convert the gangrenous sore into a healthy, granulating surface. For this purpose, a weak solution of chloride of zinc may be employed, and the parts may be dressed with compresses wet with a solution of chlorinate of soda, permanganate of potassa, carbolic acid, or tincture of opium, if there be much pain, which should be secured by a roller or other retentive measures, gentle support being at the same time afforded. Poultices, which have a tendency to favour free suppuration, thereby still further enfeebling the system, should be avoided.

If the sore, resulting from the destruction of the integuments, affect the greater part of the lateral region of the neck, and the gangrenous action be still progressing, the hot-iron may be lightly applied, as advised by M. Bonnet, of Lyons, who has employed it with immediate and complete suc-

cess in cases of phlebitis, in which the connective tissue was in a gangrenous state, and for the same condition of the tissues following phlebitis from venesection and dissection wounds.[1]

Attention must also be directed to the improvement of the general condition of the patient by hygienic and medicinal measures, which will include a free supply of fresh air, good, nutritious diet, such as an abundance of milk, beef extract, and animal broths, stimulants, not as food, but as a means of sustaining the flagging powers, and tonics, of which the best is quinia, in combination with the tincture of chloride of iron, or the mineral acids. Irritability, restlessness, and nervous depression are to be allayed by small doses of opium, or subcutaneous injections of morphia.

With regard to the treatment of hemorrhage from the ulcerated vein, little need be said, as all the cases proved fatal. In only one, Case VI., was bleeding to have been anticipated, and it might possibly have been prevented by casting a ligature above and below the dead portion of the vessel. In all instances in which it is possible to apply it, and the disorganized condition of the parts does not contraindicate its employment, it should be resorted to in preference to other hæmostatic agents. It is perfectly safe, and is not open to the objections which can be justly urged against compression, as I have endeavoured to show in a communication on "Wounds of the Internal Jugular Vein," published in this Journal (Nos. for Jan. and April, 1867). The ordinary mode of compression was the only means instituted to arrest the bleeding in the cases reported in this paper, and in all it was utterly inefficient, since sufficient pressure could not be exerted on account of impeding the respiration and provoking coughing. Should compression treatment in similar instances, however, be deemed advisable, an assistant, if he be at hand, should place his finger on the vein above the opening, to prevent the further loss of blood. A small piece of sponge is then to be held in contact with the orifice until it adheres, when it is to be supported by a compress retained by adhesive strips. Instead of sponge, a bit of patent lint, wrung out of a dilute solution of persulphate of iron, may be employed, and the entire sore may be dressed with the same material, as it will exercise a beneficial influence in checking gangrenous action, and correcting the offensive discharge.

[1] Gazette Médicale de Paris, Avril 15th, 1842.