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SEPTIC POISONING IN EARLY LIFE.*

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The extreme susceptibility to septic infection exhibited in early life is recognized by those who are called to treat disease at this time. This tendency is analogous to that shown toward the germ-poisons which are supposed to cause the various specific diseases. Young protoplasm affords a virgin soil for the growth of microbes, and the active circulatory and lymphatic systems will readily carry a developing virus to all parts of the organism. A division may be made into the septic poisoning occurring in the new-born and that which is seen in older infants and young children. Infection may even take place before birth by the passage of septic matter from the mother to the fœtus through the medium of the placenta. In such a case the infant may be still-born, or succumb a few hours after birth, without presenting any marked local changes, but followed by a rapid decomposition of the body. When a woman is in a septic condition the virus may act to the destruction of the fœtus,

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just as in the case of a syphilitic woman. As it is not common, however, for septicæmia to develop in the mother before the birth of the child, the fœtus is not so apt to be disturbed by septic influences. After birth, the vulnerable point for the entrance of septic poison is the umbilicus. When the cord is tied, the blood remaining in the umbilical vein forms small thrombi, which eventually become calcified, thus constituting part of the structure known as the round ligament. Owing to its exposed position, pyogenic germs may gain access to these thrombi, when suppuration and septic infection will quickly follow. Dr. J. L. Smith, in a communication on sepsis of the new-born read before the Pædiatric Section of the Academy of Medicine, divides infection at the umbilicus into two groups of cases: (1) those in which the poison enters the system from an umbilical sore and is conveyed by the lymphatics; (2) cases in which the septic poison gains access through the umbilical vein. As the latter vessel is somewhat pervious and is not in an internal and protected position like the ductus arteriosus and ductus venosus, the wonder is that infective inflammation is not more frequently set up in it. When this accident takes place, there will be more or less oozing of purulent fluid from the vein, soon followed by symptoms of peritonitis, erysipelas, pleurisy, or other evidences of systemic infection. Doubtless in many cases the lymphatics carry the infection after the vein has been completely closed by an obliterating endarteritis. The umbilical fossa, with its denuded epithelium, affords a convenient receptacle and favorable spot for the absorption of septic material from a diseased mother—from dirty hands, infected linen, sponges, or the air.

There has come under my observation a case where an infant was born healthy, but the mother contracted septicæmia. When the infant was three days old it began to show symptoms

of peritonitis, although the temperature was not high. At five days the general blush of erysipelas appeared upon the surface of the body, followed in a few hours by death. At the autopsy there was a red discoloration over the body and extremities, more noticeable over the legs and thighs and at the axillæ. The abdomen was tense and swollen, with no projection of the cord above the surface. The peritoneal cavity contained about eight ounces of fluid, red in color and holding flakes of lymph in suspension. Between the skin and peritonæum, in the region of the cord, was a circumscribed abscess through which the vein passed. The sheath of the vein was involved, the inflammation extending into the peritoneal cavity to the liver, the surface of which was covered by a thick layer of lymph. There were no signs of suppuration in the vein itself, nor could any communication with the surrounding tissues be found. The inflammatory process seemed to be greatest at the navel, extending to the liver and then becoming diffused. The intestines were matted together by the fibrinous exudation. The lungs contained a few patches of broncho-pneumonia, and there was considerable bronchitis.

Any abrasion or accidental wound may likewise afford an entrance to septic poison at or shortly after birth. The forceps may be responsible for the necessary solution of continuity. The delicate epithelium of the genital organs, without any apparent break, may give access to septic matter.

A female infant came under my observation who was born perfectly healthy. The mother had sore throat and some temperature, but no other evidences of septicæmia. When four days old the baby began to fail, and at five days there was some swelling of the abdomen and pain on pressure, with a slight rise in temperature. On the morning of the sixth day erysipelas appeared at the vulva and both groins, spreading up on the abdomen, but not as far as the umbilicus, and down both thighs to the knees. Death occurred in the evening. At the autopsy there was a bluish-red discoloration of the erysipelatous sur-

face, which failed to disappear on pressure, but not reaching the navel, which appeared healthy. The peritoneal cavity contained about four ounces of turbid, yellowish, viscid fluid, holding in suspension flocculi of lymph. The parietal and visceral peritonæum was coated with a moderately thick layer of fibrin, particularly well marked over the upper surface of the liver and over the spleen, but present in the pelvis and everywhere over the peritonæum. The cerebro-spinal fluid over the occipital lobe and at the base of the brain was stained with blood.

Dr. P. Müller, in Gehrhardt's "Handbuch," states that erysipelas or phlegmon, starting from the extremities or genitals in the new-born, is probably produced by small wounds following birth that furnish points for absorption of septic poison. Any possible injury that may be received during parturition may thus favor the development of septic diseases. After a certain interval of time has elapsed, and the infant has passed safely through the vicissitudes attendant upon and following parturition, there is still a considerable liability to septic poisoning. During early infancy the genitals and umbilicus are still vulnerable points. This was well exemplified in a case I recently saw in consultation.

An infant, four weeks old, with a good family history, had severe convulsions during three consecutive days, when a slight redness and induration appeared over the pubes. There was a badly arranged, uncleanly compress over the umbilicus, which presented an irritated appearance. The penis and scrotum soon became red and œdematous, and erysipelas was well marked, with a distinct line of demarkation half way between the pubes and umbilicus. This was followed by some retention of urine and renewed convulsions. The disease gradually abated under vigorous treatment, and in a week the infant had recovered.

In this case the source of infection was the genitals, but, if cleanliness and antisepsis had not been employed, the

umbilicus would soon have become likewise inflamed. Erysipelas in very young infants is not so very uncommon, and, as it is a very dangerous disease, great care should be taken to guard against all sources of septic infection. As the infant grows older, the upper part of the body, particularly the scalp and mouth, afford vulnerable areas for sepsis. The lymphatics of the head and face are numerous and active, and are thus ready to quickly absorb any poison that may present itself. The blood-supply to these parts is also abundant, which favors inflammatory conditions. With reference to the action of the absorbed poison, a division may be made into local and general sepsis. When suppuration is started upon a surface by pyogenic germs—such as the *Staphylococcus* and *Streptococcus pyogenes*—the lymphatics beneath soon participate in the inflammation. Both the germs and their products of various poisonous principles are absorbed into the lymphatic tracts, and, if they reach the blood in sufficient quantity, will cause a general poisoning. Protoplasmatic cells, by their inherent vitality, can dispose of and destroy a certain number of germs. If the latter are produced quicker or in larger numbers than they can be taken care of by the cells of the adjacent lymphatic glands, the poison will soon find its way into the system. In what may be called local sepsis a certain number of neighboring lymphatic glands are irritated and inflamed by absorption of the poison, which does not, however, find its way into the general circulation in sufficient quantity to produce any very marked symptoms. The commonest example of this is impetiginous eczema of the scalp, more particularly in connection with pediculi. The pus thus produced is unusually irritating, and quickly leads to infection of the neighboring lymphatic glands. Its infective nature is further shown by pustules on various parts of the body, where the poison has been carried by the child's fin-

ger-nails. Peculiar pustular eruptions may go through a neighborhood by one child infecting another by means of the pus accompanying pediculi. This may sometimes be mistaken for an epidemic of impetigo contagiosa.

Any enlarged or inflamed condition of the lymphatic glands about the head or neck should lead to a very careful examination of the scalp, as a very few pediculi and one or two small points of suppuration may give rise to the mischief.

I have recently treated a girl of seven years who had been perfectly healthy until her mother noticed a swelling beginning on the left side of the neck which was thought to be mumps. The child looked pale and unhealthy. This continued for three weeks, the swelling growing slowly larger, when she was brought to the dispensary. A careful examination revealed several points of suppuration upon the scalp and a few pediculi. As an abscess had formed in the neck, it was opened, and appropriate treatment applied to the scalp. The girl recovered her usual health when the source of infection was removed, and the lymphatic enlargements soon subsided.

The mouth affords very favorable conditions for the growth and development of microbes of all kinds. Where suitable cleanliness is not observed there is no cavity of the body that can become fouler in a short time. With its many crevices and corners ready to lodge decomposing food, a free access of air and suitable warmth and moisture, it would seem to be a typical place for bacterial culture. Certain forms of stomatitis, especially the aphthous and ulcerous, are often accompanied by evidences of poisoning. When the aphthous patches separate, the small ulcers left afford a favorable entrance for septic matter. In these cases the enlarged and painful submaxillary glands, with frequently involvement of the glands of the neck, are evidences of such infection. The pain and distress accompanying many cases

of stomatitis, together with the constitutional symptoms, can hardly be explained by a simple inflammation of the mucous membrane. We may arrive at a satisfactory account of all the disturbance by considering that the neighboring tissues are being infiltrated by septic matter. Many cases of local sepsis in the mouth are due to diseased teeth. Septic matter may be lodged about the roots of the teeth, which, when carious, will afford a means of absorption into the blood. In some young children the teeth appear to be cut in a decayed condition.

I have recently seen an infant of nineteen months in whom dentition began at six months. Although otherwise apparently healthy, the upper teeth came in black and quickly decayed. They produced no disturbance until recently, when the infant became feverish and restless and the upper gums and face began to swell. An examination revealed small sloughing ulcers around the stumps of the lateral incisors, with a general stomatitis. The glands on both sides of the neck were enlarged and painful.

In this case the source of infection was plainly the ulcerated gum about the decayed teeth. There are other avenues that may be noted as affording an entrance to septic matter, such as the nose and ears. Certain forms of nasal catarrh, and otorrhœa in connection with otitis media purulenta, may be responsible for the infection. In any case of lymphatic enlargement, with other evidence of local poisoning, the original source of suppuration must be carefully sought for. Not a few children said to be suffering from the so-called scrofulous diathesis are really cases of chronic poisoning by pyogenic germs, the true source of which has not been discovered. I have seen such patients poulticed and given oil and iron when an ulcerated surface in the scalp or elsewhere had been overlooked and thus allowed to continue absorbing septic germs. If the source of septic infection is undis-

turbed, the poison may be reproduced in sufficient quantity to infect the general system. This need not take place at once, but after an interval of time the lymphatic tissues may lose their power to dispose of the germs, which thus find their way into the general circulation in sufficient numbers to produce a disturbance in distant organs. It is not always easy to draw a sharp distinction between local and general sepsis, or to tell when the former ends and the latter begins. Any of the causes of local infection may likewise produce a general poisoning. Doubtless certain conditions of the system will favor such a result.

A boy of eleven years was brought to me stating he had chilly feelings and fever that came on every morning for a week. He complained some of wandering pains in the legs, but more particularly of pain and soreness on either side of the neck and front of the chest. At the beginning of his illness a large boil came on the back of his neck, followed in two days by another one, which I opened. Examination revealed enlargement of the chains of lymphatics on both sides of the neck and considerable soreness to pressure over the pectoral muscles. Upon investigating the scalp, many nits were found and several small masses of pus, with slight ulcerations. Treatment directed here relieved his symptoms.

A point of interest in this case was that the boy's parents were both rheumatic and for the past two years he had suffered from rheumatic pains in the legs and elbows. During one of these attacks a year ago he complained of pain over the heart, and his parents were told that the rheumatism had attacked this organ. Examination revealed a distinct presystolic murmur. The chilliness, with fever coming on every morning, simulated a malarial attack, but a study of the case showed that the present illness was neither due to a mild attack of rheumatism nor to malaria, but to septic infection from small ulcers on the scalp. Sometimes it is impossible to discover the original source of trouble.

An Italian baby, two weeks old, with healthy-looking parents, was brought to the Demilt Dispensary with an abscess over both wrists, which I opened, letting out a fair quantity of pus. Healing took place, but in about two weeks a swelling was noticed in the right thigh which increased until in several days fluctuation was marked. It was then opened and washed out, considerable pus being evacuated. The abscess extended down to the bone, and it was found necessary to insert a drainage-tube. In a few days a good-sized abscess formed on the back of the neck which was opened and drained. At about this time the baby began to cough, and fine râles were heard in the left lung and base of the right lung. Some dullness on percussion was soon noted on the left side, and a diagnosis of pneumonia made. As this was about clearing up, a patch of erysipelas appeared on the upper third of the left thigh. Fortunately, the infant nursed well throughout its illness and tolerated large quantities of stimulants and tinct. ferri chlorid. A gradual recovery took place without other septic symptoms. The abscess in the thigh discharged for about two months, but examination of the pus failed to disclose tubercle bacilli, and eventually it healed up completely.

An interesting case has been related to me by Dr. News where septicæmia had its origin in a nævus.

A delicate female infant had a pulsating nævus about an inch long by half an inch in diameter upon the cheek. When it was seven weeks old the doctor was called and found the infant very ill, with a high temperature and quick pulse. On the following day the nævus turned black and had a reddened, swollen base. A general eruption, somewhat resembling measles, also appeared upon the body. Death took place upon the following day. The doctor afterward learned that an old woman had professed that she could cure the nævus by treating it with a piece of placenta. A trial was allowed, and she had been vigorously rubbing the placenta into the nævus for several days before the appearance of septic symptoms.

The contagious diseases of children, particularly scarlatina and diphtheria, present the gravest forms of sepsis.

In these diseases a distinction can be made between the specific and the septic blood-poisoning. The secondary infection that produces the latter form of poisoning may ensue from the severe angina of scarlatina or from the decomposition and absorption of diphtheritic false membrane. Inflammation of the lymphatic glands of the neck with a phlegmonous cellulitis will often be present in such cases. There is nearly always a high temperature and great prostration. I have recently treated a case of scarlatina in a young child where the temperature remained about 106° F. for a week on account of sepsis. As this form of septic infection is well recognized and described fully in the text-books, further description is here needless.

Treatment.—The true line of treatment will be to prevent in every way the entrance of septic germs at any of the vulnerable points. Scrupulous cleanliness, which is practical antisepsis, should be observed from the time of birth. If the mother is in a septic condition, the greatest care must be taken not to infect the infant, principally by destroying the poison at its source by thorough disinfection. The umbilical cord and the navel wound should receive attention from the physician, instead of being relegated entirely to nurses. The cord is sometimes cut with scissors that are not over-clean. If the attendant is not sure of the scissors, they had better be passed through the flame of a spirit lamp, and thus rendered aseptic. The cord, after being thoroughly cleansed, should have a dry dressing, such as borated cotton, applied, as its speedy mummification is desirable. If suppuration begins about the navel, frequent washings with solutions of carbolic acid or bichloride of mercury must be employed. In older infants or young children suffering from evidences of septic poisoning, a most careful search must be made for any point where such material might be absorbed. The scalp, mouth,

and teeth should be carefully inspected, together with any other possible vulnerable point. When lymphatic enlargements are discovered, instead of using poultices and thus hastening the breaking down of tissue, it would seem better treatment to try and discover the focus of irritation, and, by destroying its source, prevent suppuration. If the poisoning has become general, free stimulation and support will be indicated. At the same time every effort must be made to cut off the source and entrance of septic germs.

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