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## ORIGINAL ARTICLES.

### EPIDEMIC JAUNDICE AMONG CHILDREN.

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[Read in the Section on Diseases of Children, June, 1883.]

During the summer of 1881, remarkable for its unprecedented heat as well as an unusual and widespread development of malarial fever, embracing sections of the United States rarely if ever before visited by this supposed pathogenic agent, an epidemic of acute jaundice, confined almost exclusively to children under six years of age, appeared in the city of Washington. Between the 2nd of July and the 15th of October six cases of this disease occurred within my own practice, the ages of those attacked ranging from two to six years. For the months of July, August and September twelve other cases were reported to me by other physicians, three within the service of the Central Free Dispensary, the other nine occurring in localities remote from each other, but exhibiting in every essential particular the same features as those which came under my immediate observation. It will be observed that all of these cases occurred within the limited period of three months, when the range of temperature had reached, and probably sustained for many weeks, its maximum point of elevation; but, so far as I have been able to ascertain, none of them were found in those parts of the city supposed to be especially exposed to the influence of malaria or any other mal-hygienic conditions, militating in this respect directly with the theory that the disease owed its origin to any limited local cause. Whilst I have, in common with most of those who have pursued the practice of medicine in Washington for many years, repeatedly met with sporadic cases of catarrhal icterus in both adults and children, it has not hitherto occurred to me to meet with this disease in the form of an epidemic confining its attacks exclusively to young children, a fact which cannot fail to materially enhance its importance in the estimation of the pathologist, as well as the general practitioner of medicine. In the elaborate treatise of Von Scheuoppel on biliary diseases, found in the seventh volume of Zeimssen's Encyclopædia, we find but one recorded epidemic of icterus catarrhalis confined to children alone, reported by Rhea. Legg, in his admirable work on the bile,

jaundice, and biliary diseases, after tracing the first mention of epidemic jaundice to Hippocrates, devotes three pages of his work to the bibliography of this disease, embracing a period from 1742 to 1872, describes but two epidemics of jaundice confined to children—one at Essen in 1772, reported by Brüning, and one in 1870 at Hanau, by Rehm. During the same period he reports fifty-six epidemics of the disease which occurred among adults. Sir Thomas Watson mentions an epidemic affecting young girls only, and other writers report similar epidemics in which men alone were attacked. It is possible, however, that in this latter instance such conclusions were drawn from observations made at garrisons and camps chiefly occupied by soldiers, the relative number of males and females being too disproportionate to entitle such testimony to much credit. It is to be regretted that in so elaborate and exhaustive a work as that of Legg, embracing the general history of jaundice, its ætiology, symptomatology, pathology and treatment, he should have failed to describe in detail the clinical features which characterized so interesting and rare a manifestation of the disease, as the two epidemics he mentions which were confined to children. He seems to have limited himself to the mere mention of the fact, simply giving name of authors, with the date and locality of the epidemic invasion.

In presenting the history of the epidemics to which the title of this paper refers, I do not propose to include a full description of the symptoms, progress and treatment of each particular case that came under my treatment. It is believed that a very adequate conception of the disease may be conveyed by a detailed exposition of those peculiarities which characterized in a well-defined manner a single typical case. Whilst but six of the cases above referred to occurred within my own practice and came under my immediate notice through each successive stage, I am led to believe that those reported to me by other physicians presented in every essential particular the same clinical features, and may be correctly represented by a report of the following typical case.

CASE I.—A little girl of five years of age, of delicate constitution; nervous temperament; appetite at all times feeble and capricious; subject for the last three years to occasional attacks of malarial fever of short duration, came under my care on July 2, 1881, having been attacked with fever on the previous evening. At the hour of my seeing her, 11 A. M. July 2, she had a pulse of 102; temp. 101.6; headache; tongue slightly furred; bowels torpid;

great repugnance to food; restless and nervous. Prescribed the following powder:

**R.** Hydrarg. C. Mit.....gr. iv.  
Sacchr. Alb.....gr. xx.  
M. ft. chart No. iv.  
Sig. one every hour.

Bath at 85°; to be kept in five minutes. Milk diet exclusively. If bowels are not moved in an hour after the last powder, an enema of cold water must be administered.

July 3, 11 A. M. Bowels have been twice moved without the aid of an enema. Sleep through the night frequently interrupted; complains of headache. Pulse 92; temp. 99.4; skin dry, and no appetite; discharges from bowels of a greenish-brown color, resembling in this respect those produced by calomel.

**R.** Quiniae bisulph.....gr. xij.  
Elix. glycyrrhizæ.....℥i.

M. Sig. Dessertspoonful every hour, unless it produces nausea, until the whole has been taken. If temperature ranges up and skin is dry within two more hours to be placed in a bath of 80°, and kept in five minutes. Milk diet.

7 P. M. Fever has continued all day. Quinine seems to have increased rather than diminished temperature. Pulse at this hour 108; temp. 102.5. Sponge body every hour unless temperature declines, with vinegar and water equal parts, at a temperature of 70°. If restless and unable to sleep, give potass. bromide, gr. vi, aquæ f. 3ss, well dissolved, and repeat in two hours if necessary. Milk diet exclusively.

July 4, 11 A. M. Slept at intervals through the night, with some decline of fever after 12 M. Took milk and retained it, about 2 oz. at a time four times from 10 P. M. to 8 A. M. Dose of bromide of potassium was not repeated. Sponging was also omitted after midnight. At this hour—11 A. M.—pulse 94, temp. 99.2°. Complains still of headache, and some nausea; has repugnance to food, and presents for the first time a decided icterode appearance of skin and conjunctivæ. Urine scant and high-colored. Omit all medicine and give iced gum-water slightly acidulated with lemon juice. Bath at 12 o'clock of 75°. No ingesta until seen again except the iced gum-water. If the temperature increased, renew the sponging as heretofore. 6:30 P. M. Jaundice appearance more marked. Nausea distressing. Pulse 104, temp. 100.8°. Skin dry. Urine abnormally diminished and deeply tinged with bile. Has had one feculent evacuation from the bowels since yesterday, of a light color, possibly occasioned by the exclusively milk diet. Apply compress wet with cold water constantly to the epigastrium and administer an enema of 4 oz. of cold water at a temp. of 65° every four hours, unless the bowels are moved; in that event omit the enemata. Give iced milk with one-third lime water in dessertspoonful quantities every half hour. An examination of the urine disclosed the presence of biliverdine and bilirubine, and demonstrated beyond question the true nature of the disease.

July 5, 11 A. M. Headache, fever and nausea continue, with the jaundiced appearance of the skin

slightly intensified. Pulse 104; temperature 102.4°. Has retained a small quantity of the milk and lime water; no attempt made to give anything else. Directed the cold compress to be continued with water at temperature of 60°. A cold-water enema (temp. 65°) to be administered every four hours if no peristalsis was provoked by its presence. Small quantity of albumen of egg whipped up given with scraped ice, teaspoonful at a time, in addition to the milk and lime water, if retained by the stomach. 6:30 P. M. But little change in general condition since morning visit. Slight increase of temperature and pulse; has retained the iced albumen and a small quantity of the milk. Two small evacuations from the bowels, showing a deficiency of bile. Complains still of the headache, but slept about two hours through the day. Omit after 8 o'clock the enemata of cold water and the wet compress. Give an enema at 9 P. M. of potass. bromide gr. x, mucilage gum acaciæ 3ss, to be repeated in three hours if she does not sleep. Continue the same nutriment through the night when she is awake.

July 6, 11 A. M. Patient slept more continuously through the night after the second enema of bromide had been administered, and retained both the milk and albumen when given. This morning some abatement of fever. Pulse 92; temperature 99°. Headache continues, but less severe. Repugnance to food still present, but complains only of nausea when importuned to take nourishment. Slight tenderness on pressure over epigastrium and hypochondriac regions. Bowels have not been disturbed since yesterday, and some increase in quantity of urine, which, however, retains its deep bilious color. Continue sponging with water at a temperature of 80° every hour if not asleep, and add half a teaspoonful of Valentine's meat juice to each spoonful of the milk and lime water, if not rejected by stomach. 6:30 P. M. No material change since morning. Pulse increased two beats, and temperature elevated half a degree. Headache still present, and no increase of nausea. Has passed about four ounces of highly colored urine. Continues to manifest an insufferable repugnance to food or any ingesta; observedly reduced in flesh and strength; somewhat restless and irritable. Administer 8 P. M. the enema of potass. bromide in same strength as ordered last evening, and persist with the milk, lime water and meat juice, adding ten drops of brandy to each teaspoonful given every hour when awake.

July 7, 11 A. M. Condition of patient this morning the same in most respects as at this hour yesterday; perhaps less repugnance to food. Pulse 100; temperature 99.8°; one small semi-fluid motion from the bowels during the night, indicating no increase of biliary elements; passed since last evening's visit up to the present hour ten ozs. of urine somewhat improved in color; some headache, but no nausea. Give two teaspoonfuls of the milk and meat juice with twenty drops of brandy every hour. A bath of 80° at noon, and remain in it four minutes. Apartment to be well ventilated, and temperature as low as practicable. 6:30 P. M. Has retained the nourishment through the day. Temperature and pulse very

slightly increased. Passed six ozs. of urine through the day, and slept at intervals aggregating about one and a half hours. Complains yet of headache; no nausea; icterode appearance of skin unchanged. Bath of 80° at 10 P.M., and continue the milk and brandy as directed this morning; to repeat the bromide enema during the night if she does not sleep without.

July 8. With the aid of the enema of bromide slept almost five hours through the night. Took the milk, brandy and meat juice when awake without discomfort or resistance. Temperature 98.8°; pulse 98; no disturbance of bowels. About eight ozs. of urine passed through the night, but little changed in color. Jaundiced hue of skin and conjunctivæ perceptibly diminished. Complains of no nausea or headache, and exhibits a slight but decidedly improved general condition, but expresses as yet no desire for food. Administer cold water enema at 12. Continue the same nutriment in tablespoonful doses every two hours if no indications of intolerance by the stomach. If temperature rises before afternoon visit, sponge with vinegar and water at temperature of 75° every half hour for three minutes at a time. 6:30 P.M. There has been no rise of fever since morning. Aspect of patient manifestly improved. Bowels moved by the enema, and kidneys acting satisfactorily. Has taken her nourishment through the day without opposition; more composed, and observant of things around her. The treatment for the night the same as that directed for last night. The bromide enema to be omitted, unless absolutely needed by restlessness and inability to sleep. From this date the little patient continued to improve slowly for several days, but steadily, convalescence being fully established by the twelfth day from date of attack.

Whilst the clinical history here presented of an epidemic of this peculiar and unusual character cannot fail to arrest our attention, viewed in any of its aspects, the especial features calculated to awaken interest and invite investigation will be found in the study of its ætiology and pathology. A review of the foregoing report of a purely typical case shows that the epidemic occurred in mid-summer when we had encountered an unusual and protracted period of high temperature, that the cases continued to develop from the 2d of July to the middle of October, when the systems of those exposed to this continued heat had become thoroughly insolated and an opportunity afforded for the liver and other large glands concerned in the function of digestion, located in the abdominal cavity, to become deleteriously impressed, and materially impaired in functional activity, constituting, in my judgment, an important causative factor in the development of this epidemic. That there must have been some other pathogenic agent co-operating in the cases of these particular children, who were the subjects of attack, to produce the disease is not to be denied, since but a small proportion of those exposed to the same degree of heat and general surroundings were affected. The direct connection, however, between the period occupied by the epidemic and the extraordinary high tempera-

ture which prevailed at the time, would go far when considered in connection with the acknowledged morbid influence of protracted heat upon the function of the liver, to establish the apparent relations of cause and effect in this particular epidemic manifestation of hepatic derangement. That the occurrence or production of jaundice is closely related to heat will not be positively denied, since its frequent development in hot climates and comparatively rare appearance during the winter season in the temperate zone, sufficiently attests this fact, notwithstanding the contrary statements made by many authors who have written upon the subject. To my mind those epidemics reported by different writers as having occurred in the winter season in temperate climates furnish no contradiction to the opinion above suggested, that heat constitutes an important and active agent in the production of jaundice. A little reflection will show that in all such instances referred to by those writers, the subjects of the attack had most probably during the preceding months of summer been exposed to the chances of insolation and their systems, in part, prepared thereby for the subsequent development of the disease. I confess that I fail to find anything in the reports of those epidemics which would induce me to eliminate from the active causes of epidemic jaundice the important and potential one of heat. In discussing, however, the ætiology of this particular epidemic, it is not necessary that I should refer to the numerous and manifest causes of jaundice which have been embraced in the catalogue of ætiological factors by writers upon the subject. Each epidemic reported having been attributed to some specific or local cause and therefore inapplicable, so far as the views expressed by the different authors of these reports are concerned, to the one which furnishes the subject of this paper, I say inapplicable for the reason that it is not proposed to discuss the subject of jaundice in its general character, embracing its relations to the numerous pathological conditions with which it is often associated as cause and effect, such an effort would necessarily lead us into a broad and limitless field of speculation and debate far beyond the narrow limits prescribed for this monograph. Confining myself, therefore, to a consideration of this specific epidemic, and eliminating the numerous well recognized causes of sporadic or general jaundice, I shall briefly refer to the suggestions already thrown out as to the special causal agent which operated in a more or less potential degree to produce it. That the genesis of jaundice is in some way dependent upon hepatic agency seems to be an admitted fact both by ancient and modern writers. In what particular manner or mode this agency is exercised appears, however, to have furnished a subject for endless controversy and discussion, and presents at the present time difficulties which the modern advances of organic chemistry and practical skill and progress in the use of the microscope seem rather to have enhanced than removed. The short period allowed for the presentation of this paper does not permit even a passing notice of the numerous and diverse theories which have been advanced, although they

may represent the views entertained by the most distinguished and progressive of our modern pathologists. I am, therefore, constrained to confine myself to a brief exposition of such crude explanatory hypotheses as have occurred to my mind regarding the *modus operandi* of hepatic influence in the production of this particular epidemic.

Among the numerous causes of jaundice reported by authors, we find mentioned gastro-duodenal catarrh, extending into the bile ducts, producing in various ways obstruction to the escape of bile; diminished circulation of blood in the liver, and a consequent abnormal diffusion of bile; and diseases of the *nervous system*. That jaundice is frequently produced by the first mentioned cause, no pathologist of the present day will deny. The primary morbid impression having originated in such instances in gastric or gastro-duodenal catarrh is readily transmitted along the lining membrane of the "*pars intestinalis*" of the common duct to those of the gall bladder and liver, resulting in obstruction and a diffusion of bile pigment in the general circulation. I am not prepared to admit, however, that the epidemic under consideration could have originated in any such manner. The clinical history above detailed militates directly with such a theory. By reference to that, we find that the icterode appearance of the skin conjunctivæ and other positive manifestations of diffusion of bile pigment in the general circulation, antidoted the symptoms of gastric disturbance, and as the nausea and repugnance to food became the most pronounced features of the case, we are justified in concluding that no irritation of the stomach or duodenum existed prior to the development of these two significant symptoms, and consequently such irritation must be regarded as a consecutive rather than a primary element in the case. I therefore do not hesitate to discard this mode of invasion of the disease in considering the ætiology of the epidemic. Whilst the theory that catarrhal inflammation of the bile ducts is the most common cause of jaundice, and certainly seems the most popular one with writers and practitioners of the present day, when we consider, in addition to the reason above assigned, the great variety of other causes found to occasion a diffusion of bile pigment in the blood and the peculiar icterode appearance of the skin, entirely independent of any morbid condition of the larger bile ducts, we find no difficulty in recognizing the theory of mechanical obstruction as inapplicable in this case. In further support of this view, we may cite instances of jaundice produced by poisons, traumatism, bites of serpents, *icterus neonatorum*. Jaundice produced by nervous influences, excessive secretion of bile in which that fluid not having undergone decomposition or oxydation, as suggested by Murchison, and eliminated through the kidneys and lungs, as in health, is taken up in its normal state and carried along with the blood to the tissues.

Reverting to the influence of the nervous system as one of the causative agents in the genesis of jaundice, it seems to me that we here have a probable solution to the ætiological difficulty in determining the origin of this epidemic. That the function of hep-

atic secretion, as well as that of other glands, is directly controlled by and under the dominion of the nervous system, no one will deny; and that this controlling power of the nerves is frequently exercised under the emotions, is equally true. This is abundantly shown by the excessive lacteal secretion of the mother at the sight of her suckling infant, the augmented salivary secretion by the savory odor of food. Not only is this influence of the nervous system over the function of secretion thus quantitatively demonstrated, but under certain mental excitements or morbid impressions the function becomes qualitatively deranged and deleterious to the animal economy. We see this manifested by the effects of grief upon the mammary secretion of the nursing mother; the influence of anger upon the saliva of animals, transforming a harmless secretion into an active poison. Evidence is not wanting to prove that even rabies canina has been produced by the bite of an enraged dog which was in all respects healthy; sudden change of color of the hair by emotions of fear, and many other instances of a similar nature which it is not necessary to mention. Accepting these physiological truths, we can readily conceive how certain morbid impressions made upon the sentient extremities of the afferent nerves, and transmitted to the ganglionic centers, may influence the function of an organ so richly supplied with nerves and so important as the liver; one so intimately concerned with the supreme office of elaborating and metamorphosing the nutritive material introduced in the system, and adapting it to the separate offices and functions for which it is destined. We all know that the metabolic activity of the hepatic cells in the production of bile, is in direct proportion to the plus or minus degree of blood pressure. Any agent, therefore, disturbing for a given period of time the normal physiological equilibrium of blood pressure in this organ, directly and consequentially affects the secretion of bile. This fact has been repeatedly demonstrated by experiments made upon animals, showing, for example, that a section of the splanchnic nerves causes immediate dilation of the hepatic and other abdominal veins, followed by a diminution of arterial blood pressure and an increased flow of blood into the portal vein. The normal blood pressure, and consequently the normal flow of blood through the liver, is in a great measure dependent upon the active tonicity of the arteries imparted to them by the vaso-motor filaments furnished to them from the sympathetic system. It may readily be conceived, therefore, how completely the generation of bile is regulated through the direct influence of this mysterious nerve, and how easily those causes which disturb its integrity, aberrating the normality of its office, may result in derangements of hepatic circulation, followed by hyperæmia and inflammation of the liver. Among those causes, as I have already indicated, I am disposed to regard heat as playing an important part.

We are told that the French troops stationed in Pavia during the Italian wars were affected with an epidemic of jaundice, which commenced in August and terminated in October; that the heat was un-

usually intense, and that the livers and spleens of all those who died were found enlarged and congested. Kirksig, describing the epidemic of jaundice in Sudan Scheid in 1794, says that it raged from the end of August to the end of November; that the months of June, July and first half of August were characterized by prolonged heat, and dryness, followed by a sudden change of temperature and fall of the thermometer about the middle of August—the appearance of the epidemic commencing co-incidentally with this decline of temperature. Innumerable instances of a similar nature, showing the direct connection of protracted heat with the existence of jaundice, might be cited, accomplishing such results no doubt by certain reflex actions transmitted from the sensitive surfaces through the cerebro-spinal and sympathetic systems to the involuntary muscles and secreting organs. The hepatic congestion and cholæmia found to exist in women during the catamenial presence, disappearing and returning contemporaneously with the menstrual flow, furnishes another illustration of the effects upon the liver of reflex nervous excitation originating in the nerves of distant parts. Assuming then that the molecular processes going on in the protoplasm of the hepatic cells, necessary to the formation of bile pigment or the transformation of hæmoglobin into bilirubin, can be morbidly influenced by a disturbed condition of other organs through nervous connections, and that external causes—such as heat and cold—are capable of exerting such a power through the nerves of the integument, we are met by the question, in what manner does the deleterious agent of heat operate upon those nerves which control the function of the liver, to effect such derangement of its normal office?

Scientific research and experimentation have not yet supplied us with positive data upon which we can base a conclusive reply to this question. We can only fall back on the statements already made, and resting upon repeated experiments which demonstrate the effects upon the vascularity of the abdominal organs, including the liver, resulting from a division or a lesion of certain branches of the sympathetic nerve and by a legitimate method of logical deduction assert our belief in the theory that those branches of the sympathetic supplying the vessels of the liver, and influencing directly and potentially its office of secreting bile, when subjected to the protracted excitation and subsequent exhaustion of protecting the animal economy from the deleterious effects of prolonged heat, become partially paralyzed and are no longer capable of preserving through vaso-motor influence the normal arterial tonicity of the hepatic vessels; that this paresis of the arterial coats necessarily diminishes blood pressure and correspondingly increases venous congestion with a diffusion of bile into the circulation, and a consequent condition of jaundice; that such a result may not immediately follow the exposure to heat, but does in many instances develop itself by gradual morphotic changes going on and manifested at some subsequent period.

**AMPUTATION BELOW THE KNEE-JOINT IN PREFERENCE TO BRISMENT FORCE IN CERTAIN CASES OF DEFORMITY WITH ANCHYLOSIS. ILLUSTRATED BY TWO CASES.**

BY LEWIS HALL SAYRE, M.D., ASSISTANT TO THE CHAIR OF ORTHOPÆDIC SURGERY AT THE BELLEVUE HOSPITAL MEDICAL COLLEGE.

[Read in the Section on Surgery and Anatomy, June, 1883.]

GENTLEMEN:

In all chronic inflammations of the knee-joint, such as strumous synovitis, white swelling, fungus articuli, etc., there is a reflex muscular contraction, which, unless prevented or overcome by persistent extension and counter-extension during the progress of the disease, will result in more or less serious deformity, generally a partial or incomplete sub-luxation backward with outward rotation, in which position it may be ankylosed by fibrous adhesions, false ankylosis, or by bony fusion, true ankylosis.

In all cases where the disease has entirely subsided, leaving this deformity, if it is possible to separate the patella from its adhesions with the femur, and if there is any movement whatever between the tibia and the femur, it is easier to resort to brisement forcé, even if it be necessary to make subcutaneous resection of the hamstring tendons in order that the leg may be brought into proper position. This operation, followed by the proper after-treatment, frequently results in a useful limb, and not infrequently with a movable joint.

But in cases where the patella is absolutely immovable and the tibia and femur are united by long fusion, it becomes necessary to make a V section through the angle of deformity as suggested by the late Dr. Gordon Buck, of New York, straighten the limb and secure it in that position by ankylosis. In all cases where the limb is of sufficient length to make it useful for locomotion without too great shortening, this is the preferable treatment as it results in a very useful member.

In those cases where the disease of the joint has occurred at a very early period of life, and has resulted in this deformity, the limb below the knee grows much less rapidly than the other. Patients are frequently brought to you in early adult life with the limb very much shorter than its fellow, and by the time they reach maturity the difference in the length of the limbs would make so serious a deformity that an artificial limb would be preferable to the natural one in its shortened condition. In all such cases, amputation below the knee-joint in the manner which I here intend to propose, and which is a modification of Prof. Stephen Smith's amputation at the knee-joint is preferable to resection of the bone, and attended with very much less danger to the patient.

The amputation should be performed by passing the knife from the tubercle of the tibia slightly downward and backward to the popliteal space, making a very slightly curved flap; then passing the knife from the same point on the tibia around the other side of the leg to the popliteal space with a similar curve, meeting your first incision at that point.