

foreign bodies become encrusted with various salts, and grow larger by deposit. Such an occurrence is attended with all the symptoms and dangers of stone. In the urethra they may cause inflammation and sloughing of the mucous membrane, and subsequent stricture.

Treatment.—Extraction is necessary in all cases. When impacted in the male urethra, the removal may be effected by a forceps adapted to the canal. If this fail, urethrotomy must be performed. Foreign bodies in the male bladder are sometimes broken up with a lithotrite; but in most cases perineal section (*see* page 61), or some of the operations for stone, are usually made. Substances may be taken from the female bladder with a forceps. The urethra in females is very short and easily dilated, so that the introduction of a forceps or other instrument is accomplished without difficulty.

FOREIGN BODIES IN THE RECTUM is a rare accident. Falling on the rung of a chair, or on fence-spokes, may result in a portion of these materials entering the rectum. The principal danger is from laceration of the bowel, uterus, or bladder. Death usually follows rupture of the latter organ.

The treatment consists in keeping the bowels quiet, relieving pain by opiates and warm fomentations to the abdomen and anus. If the mucous membrane is torn to any extent, and the injury will admit of it, the parts may be drawn together with sutures.

CHAPTER VIII.

BURNS AND SCALDS.

Varieties of Deformities produced by Burns.—Spontaneous Combustion.—Classification of Burns.—Constitutional Symptoms.—Duodenal Ulcers.—Causes of Death, etc.—Effects of Cold.—Frost-Bite.

THERE are few accidents which combine so many unnatural elements as burns and scalds. In none do we witness so much agony or such poor results from treatment.

Burns are to be dreaded in their remote results, as well as in their immediate consequences. Recovery in many cases is accompanied by hideous deformity. Severe facial burns not unfrequently leave the face twisted and distorted to such a degree as to almost destroy its semblance to humanity. The cheeks may be stretched to one side, the angles of the mouth widely separated, or the lower jaw drawn toward the shoulder, by a cicatrice of the neck. Burns of the neck may bend the head sideways, or draw it down on the chest. Where the arms or hands are burned, the cicatrices bend the joints out of place, and impair their movements. Thus the fingers may be doubled up and clinched, or the forearm flexed or strongly pronated. Sometimes the eyelids are fastened to the cheek, or drawn upward on the forehead. In the latter case the eyeballs cannot be covered or protected from irritating particles of dust; great distress results in this condition, from want of sleep. A case

of this kind came under my care at Bellevue, in a female patient who suffered from a severe burn of the forehead and arm. The upper eyelid was drawn up on the forehead, and fastened above the superciliary ridge. The suffering from want of sleep was considerable. Even opiates failed to bring relief. Ordinary covering for the eye only produced irritation. Finally, as there was no integument near from which to manufacture a new lid, I dissected the old one from its attachment on the forehead, and drew it down. It was retained in its position, until the healing process became complete, by means of a fine silver wire passed through, near the free margin of the lid, carried down across the end of the nose, and fastened at the back part of the head to the other end of the wire from the opposite side. This unusual operation answered the purpose admirably. Being retained in its position for several weeks, the cicatrice was prevented from contracting so as to uncover the eye, and leave it without protection. Sleep was procured for the patient; most of the hideous deformity removed, and the old lid performed its duty once more.

Many cases of burning arise from carelessness in the use of kerosene and other explosive oils in tenement-houses. This class of burns has attained a magnitude, in point of numbers, which is truly alarming. The columns of our morning journals are seldom without the history of a victim. These accidents usually arise from filling lamps near a light, or from pouring kerosene on kindling-wood to make a brighter flame. Sometimes they are occasioned by carelessness in shutting off gas. The material escapes until the apartment is filled, and upon the entrance of a person with a light an explosion takes place, and frightful burns result.

Recovery from such burns is rare, owing to the extent of surface injured.

Dangerous burns are also produced by the contact of melted metals with the body. They burrow into the flesh, and cause great destruction of tissue, and fearful scars. Melted sugar, hot mash, boiling water, etc., when applied to the body, are not characterized by the same deep eschars which attend scalds with other substances. Their effect is superficial, but, as they sometimes extend over a greater surface of the body, they are usually as fatal as burns from flame.

The appalling phenomena of *spontaneous combustion* may be mentioned in this connection. Several cases of it are recorded by reliable observers. It takes place in persons who imbibe the worst varieties of ardent spirits. There is much diversity of opinion respecting this curious accident. Some hold that the system becomes so thoroughly impregnated with alcohol as to make ignition possible through the medium of the breath; or, that combustible gases are generated internally, which take fire and destroy independently of external influences. The majority of investigators, however, believe that the combustion commences on the outside of the body. Thus, a person completely stupefied from alcohol may fall or lie down in the vicinity of a fire, and the flame may be communicated to his clothing. His helplessness, and the body being loaded with fat and alcohol, furnish all the materials for rapid combustion, and the unfortunate creature soon becomes a blackened, fetid mass.

In ordinary burns the danger to life varies with the seat and extent of the tissue destroyed. Burns of the thoracic or abdominal walls are attended with the greatest danger, on account of the proximity of important viscera.

A superficial burn, involving a large integumental area, is apt to prove fatal. Localized deep eschars are not particularly serious, unless important nerves or vessels are destroyed.

When the air-passages, pharynx, or œsophagus, are injured from hot liquids or steam, the prognosis is always bad.

The mortality from burns is always greater in childhood than in adults. The delicate and susceptible nervous system of the child succumbs to a burn, which would, comparatively, be of little consequence to an adult. In persons of tender years these accidents usually terminate in convulsions.

Dupuytren divides burns into six classes. Other surgeons have increased the number. For our present purposes four degrees of burns will be sufficient: The *first* includes all burns which redden the cutis and produce slight vesication. The *second* includes all cases where the true skin is either partially or completely destroyed, and bullæ or eschars of a brown color result. The *third* class includes all which extend through the subcutaneous cellular tissue into the muscular substance. The *fourth* includes those in which all the tissues of a limb are more or less involved in the destructive process.

We usually find, in burns, the first two degrees combined in the part affected. Where boiling water is spilled on the surface, the tissue is not broken up as when flame is apparent; with the worst cases the true skin is merely deprived of its cutis and reddened. Our classification, therefore, does not apply to this variety.

The immediate symptoms accompanying severe burns

may be divided into three stages, each differing in a marked degree, and giving rise to different indications for treatment. The immediate symptoms accompanying the first stage of severe burns are those of collapse. The pulse is small and feeble. The extremities are cold and clammy. There are great thirst, with difficulty in swallowing (*dysphagia*), and nausea and vomiting. The patient's countenance is shrunk, and has an expression of anxiety. Chills and rigors are present. The most prominent symptom is the intense agonizing pain. The pain is probably more acute than in any other form of injury, and oftentimes only relieved by death. This stage lasts from twenty-four to forty-eight hours, and the greatest number of fatal cases occur in it.

A *post-mortem* examination of persons who die in the first stage reveals great congestion of the brain and its membranes, serous effusion into the ventricles, and on the surface of brain. There is also marked congestion of all the internal organs.

The second stage or period of reaction is recognized by an increase in the temperature of the body, and a rapid pulse. The skin feels hot to the touch, and the tongue is brown and dry; the dryness being particularly apparent in the centre. There is intense pain in the head (*cephalalgia*), and sometimes delirium. Vomiting may also be present in this stage. The dangers in the second stage arise from inflammatory affections of different viscera. Meningitis is liable to occur. Pneumonia or bronchitis stands next in order of frequency. Inflammation of the intestines, giving rise to ulceration, is not uncommon. The inflammation usually commences in the upper portion of the small intestines. The peculiar duodenal ulcer which accompanies

severe burns may take place in this period, although it is more frequently seen in the third. This ulcer is situated at the upper portion of the duodenum near the pylorus. Bowman supposes it to be caused by the extra labor thrown on the intestinal glands in consequence of suppressed cutaneous secretion. It is recognized by pain in the right hypochondrium, loose and sometimes bloody evacuations from the bowels. Usually it appears on the tenth day, but it may commence as early as the fourth.

The duration of this stage varies from one to two weeks. The *post-mortem* appearances are principally those belonging to different inflammations. If meningitis have supervened, the arachnoid will be found opaque, and studded with flakes or patches of lymph. The membrane is raised by effusion of serum into the meshes of the pia mater. The brain is congested, and the ventricles contain serum. The lungs may present various stages of pneumonia, or be simply engorged. There is congestion throughout the intestinal canal, but especially in the duodenum, and there may be ulceration.

A diminution in the febrile symptoms, and the commencement of suppuration, usher in the third stage. In severe cases, the patient's condition is similar to that of the first stage. If the suppuration be excessive, death soon ensues from exhaustion. The pathological changes are much the same as in the preceding stage, with the exception that the brain and its membranes are not so often the seat of inflammatory changes, and ulcers are more frequently found.

The most common causes of death in each period are, in the first stage, collapse from injury to the nervous system

and coma due to cerebral congestion. Second stage, inflammatory disorders, as meningitis, pneumonia, peritonitis, etc. Third stage, exhaustion from excessive suppuration, hæmorrhage, or peritonitis from perforation of an ulcer, and thoracic inflammation.

The constitutional treatment varies in each period. In the first stage the intolerable pain should be relieved by opiates, and the patient roused from his prostration and collapse by the free use of stimulants. And it must be borne in mind that, when excessive pain exists, the system can bear double doses of narcotic medicines. Two or three grains of opium may be given to adults at short intervals, and increased if necessary. Morphia is best administered in solution, and, of the two liquid preparations employed, Magendie's is the best. From twenty to thirty drops may be given by the mouth, or by hypodermic injection. If the preparations of opium fail, hydrate of chloral in half-drachm doses, or anæsthetic inhalations, may be tried. Do not let the unfortunate patient suffer, but relieve him at all hazards.

In conjunction with narcotics, brandy may be given by mouth or rectum. Hot bottles applied to the extremities will be found of service. As soon as heat of the skin and increased frequency of the pulse indicate reaction, diminish the quantity of stimulants.

In the second stage there is an entire change in the condition of the patient. Inflammation is present in some of the viscera. The treatment will of course vary with the organ involved. Should the pain continue, opiates must be administered. Stimulants may be kept up and their action carefully watched. Antiphlogistic measures are not re-

quired. Beef-tea, broths, and other light, nourishing diet, are always beneficial, and cannot be dispensed with.

In the third stage there is great exhaustion, and efforts must be made to sustain the rapidly-failing vitality of the patient. Brandy, with or without ammonia, should be administered freely in conjunction with quinine. This valuable drug may always be employed in the treatment. Five grains every three or four hours will be sufficient. Beef-tea, raw-scraped beef, eggs, oysters, and other nutritious articles, are also essential. They may be given in all cases. If the stomach be too irritable to receive the medicine, diet, or stimulants, they can be safely given by injection.

There are three important rules to be remembered in the local treatment of burns: 1. Exclude atmospheric air. 2. Only remove the dressings when they become loosened by the discharges. 3. Prevent the contraction of cicatrices.

In simple burns which do not involve the true skin, very little treatment is necessary. The part may be kept wet by cloths dipped in water or sweet-oil. When the true skin is partially or completely destroyed, a thick layer of flour may be placed over the burned surface, and covered by cotton. Lint or cotton, dipped in a mixture consisting of equal parts of linseed-oil and lime-water (*carron-oil*), can be used instead of the flour. Some envelop the burnt part in cotton saturated with sweet-oil alone, and others apply a solution of nitrate of silver first, then cover the lint with cotton. I have seen the best results from the employment of flour and *carron-oil*, and prefer them over all others. Whatever dressing is employed, it should not be disturbed until separated by the exudation underneath, or unless foul odors arise. In changing, every particle should be carefully

removed, and the parts thoroughly washed with some disinfectant liquid, such as

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This solution may also be sprinkled on the dressings and bedclothes.

When granulations grow above the surface, the sore will not heal; applications of nitrate of silver and strapping with adhesive plaster will then be required.

During cicatrization, the great tendency to contraction and deformity must be counteracted by splints or bandages, and parts supported in their normal position until the healing process is completed. The hideous deformities which arise from the contractions of cicatrices are sometimes remedied by surgical procedures. No special rules can be laid down for those operations, as each one has its own separate requirements, and the common-sense of the surgeon must alone be the guide.

EFFECTS OF COLD.—FROST-BITES.

Cold is a valuable therapeutical agent in many diseases. Cold shower-baths or ordinary cold-water baths have a stimulating effect on the system, invigorating both the mental and physical forces. A dry cold atmosphere is also an efficient agent in maintaining the vital powers at a normal standard, and in destroying or keeping in abeyance injurious miasm.

Exposure of the body to intense cold results in a local or general loss of vitality. It produces a feeling of depression, a disturbance of the mental faculties, and a great desire to sleep, which, if indulged in, soon increases until a

state of profound coma is reached which may end in death. The desire to sleep is beyond the control of the sufferer, and it is here that the great danger lies. If the power of resistance, or an appreciation of the danger were felt, the person exposed might be enabled to resist until assistance was obtained. When the coma is developed, it is almost impossible to arouse the patient.

The comatose condition is brought about by congestion of the brain. The intense cold propels the blood from the surface to the internal organs. The functions of the brain, in common with those of other organs, are interfered with by the pressure of the accumulated blood, and insensibility supervenes. It is also probable that an accumulation of carbonic acid takes place in the blood owing to the diminished respiratory movements, and through its narcotic effect assists in producing the coma. Fatigue and intemperance are two great auxiliaries in making the system susceptible to the effects of cold. Persons who have been overworked, or who have imbibed freely of alcoholic beverages, succumb readily to cold. Temperate men resist long exposure to a low temperature.

The condition of the atmosphere modifies the effect of cold. Thus a much lower temperature can be borne when the atmosphere is still than when the wind is blowing. When a breeze exists, the warm stratum of air nearest the body is removed rapidly, and cold air takes its place; there is consequently more heat abstracted from the body than in the former condition. Air is a bad conductor of heat, and these warm strata afford a certain amount of protection, and lessen the demand for a higher temperature.

When only a portion of the body is exposed to the cold,

as the eyes, ears, nose, etc., there is a local loss of vitality. The part becomes pale and bloodless, and is devoid of sensation. If the vitality is only partially destroyed, a condition arises which is known as frost-bite; where the exposure has been long continued, and the life of the part totally destroyed, gangrene rapidly ensues. Little or no pain is experienced until recovery begins, and the circulation is renewed. The pain is intense, and always the forerunner of more or less inflammation. The parts become red, swollen, and hot, and the cuticle peels off. Resolution may occur in a day or two, or the inflammation may continue until sloughing or gangrene takes place.

Extreme degrees of cold and heat have analogous effects. In both the vitality is destroyed, and in both there are subsequent inflammation and sloughing of tissue, with constitutional disturbance.

Treatment.—A person suffering from frost-bite should be placed in a cold room. The part frozen may then be rubbed with snow, or ice-water poured on it, until sensation begins to return. The occurrence of stinging pain, with a change in color, is a signal to stop all rubbing or other measure which might excite inflammation. Cloths wet with ice-water may then be applied to the part. If the inflammation extend to the deeper tissues and suppuration occur, the cloths can be wet in a solution of carbolic acid and ice-water, and the application continued. When gangrene sets in, amputation is generally necessary.

In cases where the constitutional effects of cold call for treatment, general stimulation is necessary. Brandy and ammonia are to be given internally, while the body should be briskly rubbed with the hands and warm flannel.

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