

from another point of view, as to what is possible in the reduction of the death rate from distinctly preventable diseases, we would reach a conclusion not unlike the previous one.

In New York City it may be assumed that the present tubercular death rate of 2.7 may, under proper surveillance, with certainty be reduced to 1.2, and 1.5 points would thus be subtracted from the crude rate. The diphtheria death rate, already reduced 65 per cent. by the use of antitoxic serum, should certainly be reduced to one-third of what it is at present; it is now about .6 per 1,000 population. Similar reductions should be possible in the death rate from typhoid fever, measles and scarlet fever. The diarrheal diseases of infants have already been reduced in the last twelve years to one-half of their former prevalence, and should still be reduced more than 50 per cent. Thus more than 3 points may be subtracted from the crude rate in New York, which in 1903 was 18.18. The rate would then be 15+. The rate for 1903 was the lowest in the history of the city.

The most fatal affections with which we have now to deal in New York are the acute respiratory diseases, including influenza, lobar pneumonia, bronchopneumonia and acute bronchitis. The average death rate from this group of diseases now exceeds 3 per 1,000 of the population, and in years when there is an epidemic prevalence of these diseases the death rate may be 4 or more, as seems likely to be the case this year.

The advances in preventive medicine have as yet not only had no influence in reducing the death rate from this group of diseases, but, on the contrary, there has been a slow and continuous increase. I can not at this moment point out the method or the means by which a reduction is to be brought about, but still I firmly believe that with fuller knowledge such a reduction will become possible in the great cities where these diseases are so prevalent.

Something can be accomplished through the closer sanitary surveillance of the occupations and conditions under which the lower classes work, especially the noxious trades. Something, too, may be done through a closer supervision of foods to ensure their purity and freedom from adulteration.

A very difficult problem arises in connection with the diseases of the circulatory apparatus and the kidneys. My investigations have shown that in New York City a large increase has taken place, due to these causes, during the last twenty years. The acute respiratory diseases, cancer and diseases of the circulatory apparatus and the kidneys are the only important causes of death which have shown an increase during this period. The increase in cancer amounts to about 15 per cent., and the increase in the acute respiratory diseases amounts to about 15 per cent., while the increase in the diseases of the circulatory apparatus and kidneys combined equals about 40 per cent. In making this statement I have taken fully into consideration the possible influence of greater accuracy in the death returns, i. e., the inclusion formerly of these under other causes of death; but after making all allowances, it seems to me without question that an increase equaling 40 per cent. has taken place.

A very important sanitary problem is here presented to the health authorities. What are the factors in the lives of the inhabitants of our large cities (for I have found that similar increases, less extensive, however, have taken place in London, Paris and Berlin) which have caused such a remarkable increase in the preva-

lence of these affections, and how are these factors to be removed?

The time at our disposal does not permit of more than this elementary and cursory review of the work in preventive medicine. Sufficient facts have, however, been adduced to show how great have been its achievements, and some of the directions have been indicated in which its scope should be extended. With such extensions, and many others not mentioned, the future possibilities of preventive medicine seem to be even greater than the past achievements, for almost every development in bacteriology opens up a new field of work for the sanitary authorities.

Original Articles.

THE PROPHYLAXIS OF TETANUS.*

S. C. STANTON, M.D.

CHICAGO.

Before taking up the consideration of the prophylaxis of tetanus, it may be well briefly to discuss the disease and to give some statistics regarding its prevalence and mortality.

ETIOLOGY.

Tetanus is defined as an acute, specific infective disease, characterized by involuntary tonic muscular spasms, tending to become generalized and with paroxysmal exacerbations from time to time. The causative micro-organism is the tetanus bacillus which, having gained entrance to the body, elaborates a virulent toxin and this, acting on the motor cells of the spinal cord and medulla, increases their irritability and induces the spasm.¹

The tetanus bacilli or their spores are most commonly present in garden soil, street sweepings, stable manure and the feces of herbivorous animals.

In almost all cases the virus can be shown to have entered the body through a wound, and deep punctured wounds are the most likely to be followed by tetanus. The disease is more frequent in negroes than in white persons, and is more prevalent in the tropics than in the temperate zone.

PREVALENCE.

The distribution of tetanus in the various states, as shown by the United States census for 1900, is interesting. During that year 1,664 deaths were recorded; 185 of these were in Louisiana; 147 each in New York and Pennsylvania; 125 in Texas; 90 in Illinois; 76 in Ohio; 74 in Florida; 61 in Alabama; 56 each in Indiana and New Jersey; 51 in Virginia; 48 in Maryland; 46 in Georgia; 43 in Missouri, and 41 in Tennessee. Louisiana, with a census population of 1,381,625, heads the list with 185 deaths.

The prevalence of the disease by months has been investigated by Dr. H. Gideon Wells,² Chicago, who has found that the curve of deaths takes its upward start in May, reaching its maximum in July, and thence declining to October. These figures are for 1900. In 1901 there were relatively few deaths from tetanus in July, when the usual augmentation occurs. In 1902 the curve again reached its summit in July, but with a mortality of only 15 as compared with 26 in 1900.

* Read before the Mississippi Valley Medical Association at its meeting in Memphis, Oct. 9, 1903.

1. Encyclopedia Medica, vol. xii: "Tetanus," by W. T. Ritchie, M.D., Edinburgh.

2. Fourth of July Tetanus, American Medicine, June 13, 1903.

The deaths from tetanus in Greater New York reached a maximum of 21 in July, 1899, the greatest totals in any other month of the year being 5 in June and 4 in September, the total deaths for the year being 38. In 1900, 13 deaths occurred during July and 5 in June out of a total of 33 for the year. In 1901 there were only 5 deaths in July, and this number was exceeded in April and October, in each of which months 6 deaths occurred.

The statistics of the census of 1900 show that 222 deaths from traumatic tetanus occurred between the ages of 10 and 14; 149 between the ages of 5 and 9; 117 between the ages of 5 and 19; 84 between the ages of 20 and 24; 79 between the ages of 25 and 29, and 77 between the ages of 30 and 34. As far as these statistics go, it appears that the greatest mortality from this disease occurs before the age of 19, and that the mortality below the age of 14 is about three times as great as that between the ages of 15 and 19.

THE JOURNAL of the American Medical Association has taken up exhaustively in its August 9 (1903) issue a subject which must interest the American physician deeply—namely, the tetanus following the Fourth of July celebration. Its statistics show an appalling and unnecessary slaughter of the innocents. The total number of deaths due to Fourth of July injuries is 466, of which 406 were due to tetanus. Pennsylvania heads the list with 86, and is followed by Ohio with 77, Illinois with 59, New York with 41, Michigan with 31, Missouri with 29, Massachusetts with 17, Minnesota with 15, Iowa with 16, Indiana with 14, Kansas with 13, and New Jersey and Wisconsin with 10 each. With but few exceptions, the victims were small boys.

The cause of Fourth of July tetanus has been supposed to be the presence of tetanus bacilli in blank cartridges, but this can not be considered as proved, as only one of the several investigators detected tetanus bacilli in blank cartridges or wads. The bacillus has, however, repeatedly been found in the dust of the streets where tetanus has been prevalent.

As a result of the investigations, we may conclude that there is no convincing evidence that blank cartridges contain tetanus bacilli, except as a rare contamination; there is, on the other hand, ample evidence that tetanus bacilli are present in street dust and on the persons and clothing of the injured, and the most reasonable conclusion is that of La Garde, Wells and other investigators, that the organisms are carried into the wounds from the surface at the time of the accident.

PROPHYLAXIS.

As the greatest mortality during the year is observed about the time of the national celebration on the Fourth of July, it naturally follows that in the prophylaxis of tetanus this important factor should not be omitted.

The prophylaxis of tetanus may be considered under five heads:

1. The enforcement of existing laws regarding the sale of toy pistols and other dangerous toys. In most cities and in some states there are already laws, supposedly in effect, which prohibit the use of firearms and the setting off of fireworks. At and around the time of the Fourth of July, however, these laws are almost invariably forgotten, or at least their enforcement is criminally neglected. A striking example of the results of enforcement of ordinances regarding the use of explosives is furnished in Washington, and this city does not show an increased mortality from tetanus in July.

2. The enactment of laws by Congress, state legis-

latures and municipalities prohibiting the manufacture and sale of toy pistols, blank cartridges, dynamite canes and caps, cannon crackers, etc. Spurred on by the terrible aggregate of deaths which followed the Fourth of July this year, several medical societies have already recommended the adoption of ordinances which shall avert the possibility of a repetition of this heavy total in after years. Several city councils have also drafted and adopted ordinances on these lines, but without enforcement such ordinances are of no effect, and the slaughter will be continued.

3. The open treatment of all wounds, however insignificant, in which from the nature or surroundings there is any risk of tetanus. By open treatment is meant the free opening of the wound, cleansing from all foreign substances, swabbing thoroughly with 95 per cent. carbolic acid, followed by open dressing of the wound, with the institution of drainage. During the preparation of the grounds and buildings for the World's Fair in Chicago, at which time the conditions for the development of tetanus were exceedingly favorable, by reason of the excavation, turning over of black soil, etc., more than 1,500 cases of punctured, incised and contused wounds were treated by the surgical staff on the grounds; in most instances the patients returned to work in two or three days, and in no case did tetanus develop.

4. The immediate use of tetanus antitoxin in all cases of Fourth of July wounds, wounds received in barn-yards, gardens or other places where the tetanus bacillus is likely to be present or tetanus infection to occur. The neutralization of any toxin still in the blood and not yet fixed in the nerve-cells can be effected by the injection of from five to ten cubic centimeters of tetanus antitoxin. This injection should be made as early as possible, and while its use may seem superfluous in cases in which wounds have been treated immediately and thoroughly, still it does no harm and gives additional assurance to the patient.

5. The injection of tetanus antitoxin as soon as tetanic symptoms become manifest. When the infection has so progressed that tetanus symptoms appear, the use of antitoxin is a forlorn hope, for, as Wells says, "a patient who has just developed symptoms of tetanus is not just developing the disease, but is dying of it." Although the results from the injection of tetanus antitoxin after the development of tetanus show thus far that only an exceedingly small percentage of recoveries take place, still, when the almost certainly fatal outcome of the acute form of the disease is considered, the use of tetanus antitoxin is made justifiable.

In the presentation of this subject I am aware that I am not submitting anything original; but I desire earnestly to urge on the members of this association the advisability, or even the necessity, of carrying on the propaganda begun by THE JOURNAL of the American Medical Association and continued by the medical and lay press. Heretofore there has been much excitement regarding the matter of Fourth of July injuries for a month or two following the celebration, but then, with the lapse of time, the appreciation of the needlessness of this mortality lessens, and until public attention is directed to the next series of deaths little thought is taken by the majority of the people. Physicians should take on themselves the burden of keeping the public aroused to the appalling mortality which succeeds a supposedly peaceful celebration, a mortality which with proper and thorough treatment, and with the enactment of sufficient laws, might be practically abolished. If the pro-

fession of the country would take united action in this matter, the mortality of 406 from tetanus following Fourth of July accidents alone might, in 1904, be reduced to zero. When it is remembered that by far the greatest number of deaths occurs in individuals who have not yet reached the age when they are able to distinguish between things dangerous and things safe, the responsibility of the physician as regards instruction of parents of the dangers to be feared, and in the precautions to be observed and the treatment to be carried through, is immeasurably increased. The saving of 400 lives from a burning or sinking ship would be considered well worth the doing. How much more important is the saving of hundreds of lives of the innocents from an unnecessary and horrible death!

PROSTATECTOMY.

REPORT OF 51 CASES OPERATED ON FROM MAY 6, 1901. TO FEBRUARY 26, 1904.

JOHN B. MURPHY, A.M., M.D.
CHICAGO.

(Continued from page 1413.)

TECHNIC OF PERINEAL OPERATION.

The incision is made in the median line of the perineum to within three-quarters of an inch of the anal orifice. The latter limbs of the incision now diverge from each other in an oblique direction on each side of the anus to the margin of the ramus and backward to the level of the posterior anal corrugations. The scalpel is used to divide the superficial perineal fascia, and the handle is then used to separate the muscle fibers in each lateral incision down to the deep perineal fascia and capsule of the prostate. This leaves the median raphe and the tissues for one-half inch on each side of it intact. By following this plan and always separating the muscular fibers in a backward and outward direction, the rectum is safe from injury.

After the completion of the lateral incisions the index finger of the left hand is inserted into the rectum and, with the scalpel, the central bridge of tissue mentioned above is divided close to the wall of the rectum down to the capsule of the prostate. The object in keeping close to the rectal wall in this last step of the operation is to avoid the hemorrhage which would occur if the corpus spongiosum were cut. In the tissues thus divided there are few vessels and practically no blood is lost.

The rectum is now pushed a little farther posteriorly, and the deep perineal fascia and capsule of the prostate are divided transversely with the blade of the scalpel. In my early operations I made the capsular divisions on each side of the median line and parallel with the raphe, but as the raphe must be eventually divided I now make one transverse incision across the entire capsule dividing the central septum. The handle is again used to free the capsule from the prostate on both sides sufficiently to allow the insertion of the index finger which liberates the capsule from the lateral lobes and posterior isthmus back to the bladder wall. A short, broad Sims' speculum is then inserted and used to displace the rectum and capsule backward. One four-pronged cat's paw hook retractor is now put in each lateral lobe as far back toward the bladder as possible, and used to draw down the prostate *en masse*. A long curved scissors now divides transversely the posterior urethral wall anterior to the prostate. The division is then continued on each side through the lateral attachment of the anterior

isthmus to the posterior boundary of the prostate. This boundary can be readily recognized as the urethra is open. The prostate is now free from all of its connections anteriorly and laterally, and is removed entire when the posterior urethral wall behind the prostate is divided transversely.

It will be seen from the above description that all of the posterior prostatic urethra to the sphincter vesicae internus is removed with the prostate.

This particular method of separating the prostate from its attachment to the bladder makes the procedure practically a surface operation from beginning to end.

After the last step described above is completed, the sound is withdrawn and the finger passed into the bladder to examine its interior and to determine whether or not stones are present or to detect enlargements of the middle lobe or pedunculated growths from the lateral lobes. If the latter are found they can be readily removed without lacerating the sphincter.

The lateral edges of the prostatic urethra are now brought together to form a new canal, by means of a continuous catgut suture, which is inserted from behind forward. Only space enough is left for the drainage tube which passes into the bladder. A loose packing of bismuth subiodid gauze is now put in the cavity of the

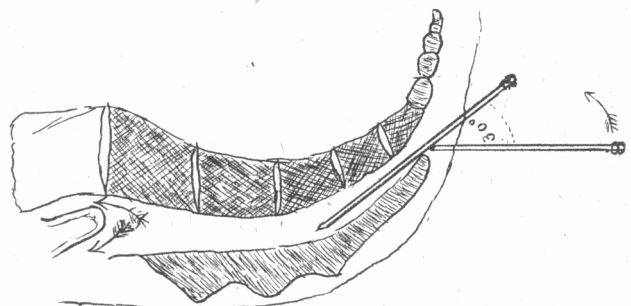


Fig. 10.—Showing needle inserted through hiatus sacralis into sacral canal for the purpose of producing analgesia by epidural injections of cocain solution.

capsule, the end of the gauze with the tube protruding through the left angle of the incision. The divided perineal muscles are sutured back into position with catgut and the skin approximated with silkworm gut.

The tube is removed from the bladder four to ten days after the operation, depending on the degree of cystitis present. The gauze is removed on the third day after the operation and the wound allowed to close.

SUPRAPUBIC PROSTATECTOMY.

In this operation we have followed the plan of Freyer, that is, of splitting the bladder mucosa over the lateral lobes, inserting the finger beneath the mucosa and enucleating the prostate—bringing with it the prostatic urethra. While it can be accomplished and is indicated in cases where the prostate is high up and firmly fixed, it is not at all so clean-cut and precise a procedure as is the perineal operation described above. It has the disadvantage of requiring irrigation in order to keep the bladder aseptic. It has the advantage, however, of assurance against perineal fistula, but the perineal fistulae leak only during urination, while the ventral fistula following the suprapubic operation leaks more or less continuously, and from our experience, the healing is no more rapid.

The surprising feature of the suprapubic operation after this method is that stricture is not more common, and it does seem as though incontinence should occur