should himself do the dressings for the first few times if he would avoid the occasional liability to further trauma by separation of blood clot and unnecessary spread of infection resulting from dressings done by one unacquainted with the wound.

14. Conservation may result in the retention of functionless or worthless portions—necessitating amputation later—especially is this so after crushing injuries. This does not argue against the advisability of conservative methods. It is surprising what functional recoveries take place. The practitioner is well advised to be extremely conservative until his experience enables him to foresee end-results very definitely.

THE EPIDEMIC OF VIRULENT SMALLPOX IN WINDSOR AND THE VICINITY*

February, 1924.

F. ADAMS, M.B., D.P.H.

M.O.H. for the Essex Border Municipalities

IN the latter part of February, Windsor and the vicinity experienced an outbreak of smallpox unusual in origin, often unusual in transmission, irregular in type, and shockingly virulent, but yielding, as all smallpox yields, to vaccination. This paper is an attempt to set forth the main features of this epidemic.

Origin of the Epidemic.—The origin of the epidemic was unusual. On February 2nd., G. D., a respected citizen of Windsor, came down with an extraordinary sickness from which he died on February 11th. He was seen during his illness by four physicians, including two experienced consultants. There is now no doubt that this man's illness was hæmorrhagic smallpox but the disease was so irregular that it was not recognized. It was only when persons who had been in contact with G. D. began to come down ill with the symptoms of smallpox that there was any suspicion as to the true nature of his malady. Very soon it became plain that the disease was not confined to the Border Cities but had broken out in Amherstburg, Maidstone, and Detroit, Mich., U.S.A., all originating in the one missed case. The total number of cases of smallpox in all these places was sixty-seven and the number of deaths was thirty-two.

Difficulties in Diagnosis.—One of the outstanding features of this epidemic of smallpox was the irregular character of a large proportion of the cases and it may be useful to present some of the unusual cases briefly.

To consider first the original missed case.

Case 1.—G. D. This man took sick on a Saturday night with a violent headache, vomiting, sore throat, and some general pains in the back and elsewhere. On Tuesday he broke out everywhere with a rash resembling urticaria such as often follows the administration of diphtheria antitoxin. His whole body was covered by raised irregular blotches of all shapes and from a bean to an egg in size. On Wednesday this rash was a light brown in colour. His principal complaint was a persistent headache, sore throat, and sore mouth. He had been in the past troubled with repeated attacks of sore throat; his teeth also had bothered him a great deal and he had intended having them all out because of pyorrhoea. His temperature was about 101°, he was perfectly rational, answered questions readily, even rose to laughing at a joke. He readily sat up in bed, opened his mouth, put out his tongue and said "Ah" to have a throat swab taken. He was unvaccinated but gave no history of exposure to smallpox. There was no particular change in the symptoms except that the rash became darker as the days went by and about two days before death occurred there was hæmorrhage from the bowels. The diagnosis made by all physicians who saw this man was purpura hæmorrhagica and it was believed that the root of the trouble lay in the sore throat or bad teeth of the patient.

*Issued by the Provincial Board of Health, Ontario.

It is to be remembered that this case came out of a clear sky, that each of the physicians who saw the case was experienced in the diagnosis of smallpox and that in spite of this the diagnosis was completely missed; at no time during the epidemic which followed did a case occur that looked in the least like this first one; the source also of the infection of this initial case has not been discovered.

Case 2.—J. I. On Wednesday, February 20th., this man took ill with severe headache and pain which the physician thought at first was in the patient's back, but on further examination seemed to be in the abdomen extending down into the groin. He was unvaccinated but gave no history of contact with smallpox and was sent into one of our general hospitals as a case of surgical kidney. That was late Wednesday night or early Thursday morning. On Friday morning he broke out in an intense red rash which is so well described in the chapter on smallpox in Ker's *Infectious Diseases* that the description is given *verbatim.*

"A very interesting and ill-omened form of erythema, which is sometimes classed as scarlatiniform, but which has distinct characters of its own, is the rash which is called by French authors "le rash astacoïde" or the lobster rash. This is a very vivid and intense erythema, almost erysipelatous, of a most brilliant red colour, approaching more the tint of scarlet than anything ever seen in scarlet fever. It is general all over the body and involves also the face, which is usually congested and puffy. It only occurs in hæmorrhagic cases, and is therefore of grave prognostic significance. It is early followed by hæmorrhages into the conjunctive and later over the surface of the skin."

This patient died twenty-four hours later with hæmorrhages from the bowel and under the skin everywhere. His temperature never exceeded 101°. His total illness was under four days. He had never been vaccinated. He had been asked if he had been in contact with smallpox and said "No." As a matter of fact he had visited Case No. 1 but at the time he took sick he did not know that G. D.'s illness was really smallpox.

Case No. 3.—On Sunday, February 24th., M. B., a trained nurse, aged 34, was sent from out of town into the other one of our general hospitals and had her appendix removed the same night. Haemorrhage had occurred in the distal end of the appendix. During Monday night she broke out with a mixed kind of rash. Her face was flushed as with scarlet fever but the eyes were inflamed. There was a rash on the body which resembled measles. She had come off a scarlet fever case two weeks before but believed that she had had scarlet fever as a child. She had no sore throat and no strawberry tongue. The inflamed eyes with a rash on the body rather pointed to measles but there was no typical measles rash on the face, no spots in the mouth, no cold in the head nor bronchitis. She had never been successfully vaccinated but had not been exposed to smallpox as far as she knew. The case was not believed to be smallpox but in view of the uncertainty of the diagnosis the case was isolated and the nurse who was caring for her was vaccinated at once. Wednesday the patient continued much the same; Thursday it was learned that the patient's brother had smallpox and the home was in quarantine; Friday there was blood in the urine and on that day we allowed the patient to go home, where she died a few days later. Exposure to smallpox was traced later.

Case 4.—At about the same time a man was sent into one of our general hospitals vomiting blood and passing blood from the bowel. He had a fever of 101.5°; no history that would point to gastric ulcer or anything of that kind and no signs or symptoms that would point to typhoid. He had been vaccinated successfully in childhood and again about ten years ago and still again since the beginning of the epidemic, the last vaccination not having taken. The patient was thirsty and had the typical appearance of a straight hæmorrhage case but not knowing precisely what was wrong with him we had him strictly isolated. Later on we concluded that his hæmorrhage was due to taking 105 grains of aspirin in fifteen hours. He recovered.

These cases will, I think, serve to illustrate some of the difficulties we had in the way of diagnosis in the presence of an epidemic of irregular smallpox. Ordinarily the differential diagnosis of smallpox is from influenza, chickenpox, drug rashes, and perhaps syphilis and impetigo. These were not the diseases we had to consider, but scarlet fever, measles, erysipelas, surgical conditions of the abdomen, aspirin poisoning, peliosis rheumatica and exfoliative dermatitis.

We have made an attempt roughly to classify the types of cases seen in the Border Cities. All counted we had in the Border Cities thirty-four cases of smallpox. Eight of these were in persons who had been vaccinated years before and all of these cases were perfectly clear cases of smallpox. Six cases were vaccinated during their incubation

period and came down with smallpox and a taking vaccination. All of these were also perfectly plain cases of smallpox, offering no difficulties in diagnosis. Twenty-one cases had never been successfully vaccinated at any time in their lives and of these no less than eleven were irregular in type. Of the eleven distinctly irregular cases, one had a rash which might be described as hæmorrhagic urticaria, six had lobster rashes more or less complete, one had lobster rash on the face and a measles-like rash on the body, three had a flushed face and a smallpox rash which came out late and badly. It is to be noted that not one case presenting the features of irregularity that have been described recovered from the disease.

Cases of Smallpox without a rash.—Not included in any of our figures as actual smallpox were eight cases in the Border Cities and three at Amherstburg presenting the following features. They were all in persons vaccinated before and having good scars, ten years or more old. They came down ill with the usual symptoms of smallpox—fever, headache, backache, prostration, and so on. After an illness of three or four days they recovered completely without developing a rash. We are inclined to the opinion that these cases were true infections but the evidence is not conclusive.

Methods of Transmission.—Smallpox is usually transmitted by at least a fairly intimate contact with a case and ærial infection, fomites, third person carriers; and cases having symptoms but no rash play a relatively small part in transmission. In our epidemic these unusual methods of transmission played a very considerable part. Out of a total of sixty-seven cases these unusual methods of transmission apparently operated in no less than twenty-nine.

Measures adopted to control the epidemic.—When the epidemic first broke out there was a period of two or three days in which we were not certain that we were really dealing with an outbreak of smallpox. The cases were irregular and it was only after we had seen two or three typical cases that we were sure of what we were dealing with. While certain preliminary steps had been taken two or three days before, it was on Saturday night, February 23rd., that the Board of Health met to determine what measures should be taken to check the epidemic. By that time we knew that the disease we were dealing with was smallpox; that the community was seeded with cases; and that it was an exceedingly virulent and irregular form of the disease. The Local Board of Health for the Essex Border Municipalities has a distinctly unusual composition. The Board has jurisdiction over six municipalities, and every member of the Board is a doctor who has at some time been a medical officer of health himself. The measures decided upon by the Board were as follows: Provision was made for the care of the sick and the maintenance and medical supervision of families in quarantine, but the most vital decision of the Board was in respect to vaccination. The Board was a unit in the opinion that the one thing that would stop the epidemic was vaccination of the whole population. Our population is about 70,000 persons and the problem before the Board was to get that population vaccinated in the shortest possible period of time. The procedure decided on was as follows. Then and there three of our nurses using three phone lines called up every doctor in the Border Cities that could be reached and asked him if in the emergency he would consent to vaccinate any person who came to his office free of charge, with the definite understanding that the Board of Health would supply vaccine and pay for vaccinations at the rate of 25c. apiece. Within half an hour we had the consent of about three-quarters of our doctors. The rest could not be reached but we assumed their consent and telephoned them Sunday morning. Before midnight a statement of the situation was prepared and sent out to every clergyman in the Border Cities, with a request that it be read from the pulpit at every service on Sunday. The gist of the announcement was that an epidemic of exceedingly severe smallpox was present in the Border Cities, that there had already been a number of deaths and that everyone was advised to be vaccinated at once and to have all the members of his household vaccinated, finally, that arrangements had been made with every doctor in the Border Cities under which he would vaccinate any one who came to his office free of charge. On Sunday at our request the secretary of the Chamber of Commerce called up every large employer of labour, explained the situation to him and asked him to urge vaccination upon all his employees Monday morning. Monday afternoon a full page advertisement of the Board of Health setting forth the situation appeared in the local paper.

The effect of these measures was all that we could have asked for. There are some seventy doctors in the Border Cities and we had simply created seventy free vaccination stations. The doctors' offices

began to be crowded with applicants for vaccination on Sunday morning and within the next six days we estimate that well over ninety-five per cent. of our population was vaccinated. There was nothing compulsory about any of our methods. We simply took the public into our confidence, told them the situation as it really was, advised general vaccination and made provision for it without charge. The anti-vaccinationist, usually so noisy and troublesome, gave us no trouble at all. As far as checking the epidemic was concerned the effect of these measures was perfect. We had one big splash of cases and then no more and this freedom from any recrudescence has continued without interruption right up to the present moment, almost three months.

Vaccination.—The total figures for the whole epidemic covering the Border Cities, Amherstburg, Maidstone and Detroit are as follows:

	Cases	*Deaths*	*Mortality*
Never successfully vaccinated.	45	32	71%
Vaccinated successfully 12 to 65 years before.....	10	0	0
Vaccinated successfully in incubation period *i.e.*, came down ill with smallpox and a taking vaccination.....	12	0	0
Totals.....	67	32	48%

You will note that no person who had ever been vaccinated successfully at any time in his or her life, whether it was in the incubation period of smallpox or years and years before, died of smallpox. You will note also that of the persons who had never been successfully vaccinated and who developed smallpox seventy-one per cent died of the disease. That is a wonderful story in regard to the efficacy of vaccination as mitigating the severity of the disease, but the figures by no means tell the whole story.

A few persons who had never been successfully vaccinated recovered but they all had severe attacks and had a terrible fight for their lives.

On the other hand persons who had been previously vaccinated successfully, no matter how long before, had mild attacks. Incidentally it should be mentioned that no one vaccinated successfully within twelve years took smallpox at all. But the real marvels of vaccination can, in my opinion, be appreciated only by personal experience in an epidemic such as we went through in the Border Cities. I feel that I might very well close this paper by telling you of some of our actual experiences.

In Windsor there is a family named M—, consisting of ten persons. All of them were exposed to smallpox and about equally. Nine of them had been vaccinated successfully in previous years and none of these contracted smallpox. The tenth person had never been vaccinated, contracted the disease and died inside of four days of the hæmorrhagic lobster rash type of smallpox.

During the epidemic we had to employ a large number of nurses to look after the sick and we had also to expose to the disease orderlies, ambulance drivers, clergymen and others. We made it an absolute rule that no one should be exposed to smallpox through our action unless that person had a vaccination scar already and was also freshly vaccinated by us. The result of this precaution was that not a single person who was exposed to the disease through any action on our part came down with smallpox.

Of course when a case of smallpox developed in a household we vaccinated every other person in the house. Contacts of this kind which in Maidstone, Amherstburg, and the Border Cities run into the hundreds, all, as far as I know, escaped smallpox as a consequence of timely vaccination.

In Windsor a certain Mrs. McL., 62 years of age, never vaccinated, developed smallpox and died of it. Her husband, 72 years of age, vaccinated successfully 62 years ago, had a trifling attack of the disease.

Mrs. J. D., of Walkerville, 52 years of age, never vaccinated, developed smallpox and died after an illness of eight days. Her husband with a history of exposure many times in excess of that of his wife, had a trifling attack of smallpox. He had been successfully vaccinated twelve years ago.

The proprietor of a laundry came down sick with smallpox and on investigation it was found that out of a total staff of twenty-five persons at the laundry he alone was unvaccinated and he was the only one who contracted the disease.

A. D., age 50, and his son R. D., age 25, neither having been successfully vaccinated, died of smallpox. Mr. A. D., vaccinated successfully thirty-two years before, took smallpox also but it was a trifling illness.

Mrs. B., of Windsor, came down with a mild attack of smallpox. She is fifty-eight years old. When she was eight years old she went into a convent for three years and in the first of those years she was vaccinated successfully. As a result of that vaccination fifty years ago her attack of smallpox was a negligible affair. The scar on

her arm is so faint that it can be recognized only by careful search in a good light.

G. D., the man who had the original illness that was smallpox but was not diagnosed as such, had a daughter Josephine, twelve years old. She was exposed to her father through the whole course of sickness and later on to her mother and aunt who developed smallpox *but she has not had one single day's illness herself*. Six years ago she was vaccinated to go to school and she has on her left arm a scar about the size of an old fashioned Canadian five cent piece. Twenty-one close relatives of this little girl, all unvaccinated, are dead of smallpox

It is when one has had close personal experience with incidents such as these, when one has had to send nurses by the dozen up against the most virulent smallpox with nothing to protect them except vaccination and they nurse the disease week in and week out without contracting it, when one has seen a community of thousands of persons threatened with decimation by smallpox and one has seen wholesale vaccination pull the disease up short and weeks and weeks go by without any fresh cases at all, then and then only does one fully appreciate the marvellous gift which Jenner made to science and to humanity.

Lessons to be learned from the Epidemic.

1. Exceedingly virulent smallpox is present in the province.
2. Irregular forms of the disease presenting great difficulties in diagnosis, are apt to occur.
3. The disease may be transmitted through unusual channels and quarantine of cases and all contacts should be very rigid.
4. Vaccination is the one sure weapon against the disease.

In this epidemic—

(*a*) No one vaccinated successfully within twelve years contracted smallpox.

(*b*) No one ever vaccinated successfully, no matter how long ago, died of smallpox.

(*c*) Of the smallpox cases in persons who had never been successfully vaccinated, 71% died.

(*d*) Vaccination of almost the whole population stopped the epidemic abruptly and completely.

Postural Defects Affecting the Rectum.—A variety of pains referred to the ano-rectal region but of obscure origin, are believed to be due to a faulty sitting posture. These pains are referred through the sacral plexus. Orthopedists recognize four points in the spine usually strained and of these the lumbosacral region is the part most exposed to pain. Strain results from weight and pressure applied to the cocyx and sacrum from unnatural directions. The skin over the cocyx and sacrum show keratoses, while the usual keratotic areas over the tuberosities of the ischia are absent. The diagnosis is made from the history of vague pains, the characteristic skin changes, and absence of lesions in the bowel.—*Trans. Am. Proctological Soc.*, 1924.

Heredity and Hypertension. — James P. O'Hare, William G. Walker and M. C. Vickers, Boston, analyzed the family histories of 300 unselected cases of permanent hypertension. In 204, or 68 per cent. of this group, there was a definite history of apoplexy, heart disease, nephritis, arteriosclerosis or diabetes in one or more members of the patient's family. The number of relatives with vascular disease averaged 2.5 per patient, with the minimum one and the maximum nine. The large bulk of the relatives that had vascular disease, had heart, cerebral or kidney disease. The authors feel that these cases demonstrate rather conclusively that a family history of heart, kidney, cerebral disease, etc., is almost twice as common in a patient with hypertension as in the ordinary patient who has no increased blood pressure. Nature very frequently sounds a warning as early as the second decade in life of the possible development of hypertensive disease in the fourth or fifth decade. Such symptoms include frequent epistaxis, abnormal flowing at menstruation, migraine, cold, sweaty and cyanotic hands, flushing, blushing, extreme sensitiveness, a high strung and nervous temperament, etc.—*Jour. Am. Med. Ass.*, July 5, 1924.