

Greatly needed is this reminder that we are never free of the menace of smallpox. It is ironical that, once again, hospital personnel were involved in this outbreak. Details of the successful use of a new vaccine will be of interest to all.

Outbreak of Smallpox in the Lower Rio Grande Valley of Texas in 1949

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ON or about February 20, 1949, Dr. X, in Hidalgo County, Texas, was called to the home of H.B., a worker in a citrus-juicing plant. H.B. had been suffering from chills and fever and was covered with a macular rash. Dr. X suspected that H.B. had typhus fever. This was the only contact Dr. X had with H.B. On February 29, Dr. X became ill with chills and fever. Meanwhile W.P., an oil-field worker in adjoining Starr County, had been admitted to a local hospital with a febrile illness, which was not immediately identified. On March 5, Mrs. H.B. became ill, followed on March 7 by B.B., a ten-year-old son. On March 9, J.R., a county commissioner, became ill. Most of these illnesses had become known to the Hidalgo County Health Department by the time of the death of Mrs. H.B. on March 12. This fatality evidently was from smallpox and suggested a probable diagnosis of smallpox on other cases. Suspected cases were isolated and known contacts were vaccinated with C.A.M. vaccine supplied by the State Health Department, as later described. Two additional cases, M.M. and C.G., were found, as shown in Table 1.

On March 15, pus was obtained aseptically from H.B., W.P., Dr. X, B.B.,

and J.R., and taken to the laboratory on wet ice. Inocula without an antibiotic were dropped on the chorioallantoic membranes of 11-13 day old embryonated eggs, several of which developed discrete plaques or "pocks" demonstrably free of bacteria. With infected membranes the small glistening points of proliferation were evident 36 hours after inoculation, as shown in Table 2.

Passage of the infections to other embryonated eggs was readily accomplished. The infective membranes were harmless for mice inoculated by the intracerebral and other routes. Acidophilic-stained masses characteristic of Guarnieri bodies found in smallpox were demonstrated in the infected membranes. These findings were consistent with positive tests for smallpox.^{1, 2} Subsequently a similar agent was recovered from pus from M.M. and glycerinated crusts treated with penicillin or penicillin and streptomycin from H.B., Dr. X, B.B., and C.G. A post-mortem specimen from Mrs. H.B. was unsatisfactory. The virus was not often found in the badly desiccated crusts collected late in the illness.

Since H.B. and W.P. became ill during the same week, a common source of infection seemed probable. This source

TABLE 1
Data on Eight Cases of Smallpox

Case	Date of Onset	Age	Sex	Race	Probable Source of Infection	Outcome of Illness
H. B.	2-17-49	51	M	A *	Unknown	Recovered
W. P.	2-22-49	37	M	A	"	"
Dr. X	2-29-49	34	M	A	H. B.	"
Mrs. H. B.	3- 5-49	43	F	A	W. P. or H. B.	Expired
B. B.	3- 7-49	10	M	A	H. B.	Recovered
J. R.	3- 9-49	42	M	A	W. P.	"
M. M.	3-15-49	40	M	L †	Unknown	"
C. G.	3-25-49	17	M	L	"	"

* Anglo-American.

† Latin-American.

TABLE 2
Results with Chorioallantoic Membrane Infection Test for Smallpox

Case	Date of Specimen Collection	Date of C. A. Membrane Inoculation	Number of "Pocks" Observed in 36 Hours	Result of Test
H. B.	3-15-49	3-17-49	numerous	+
	3-23-49	4- 2-49	2-10	+
W. P.	3-15-49	3-21-49	numerous	+
	3-15-49	3-16-49	"	+
Dr. X	3-30-49	4- 2-49	2-10	+
	4- 7-49	4-14-49	none	negative
Mrs. H. B.	3-17-49	unsatisfactory		
B. B.	3-15-49	3-21-49	numerous	+
	3-30-49	4- 2-49	0-6	+
	4- 7-49	4-14-49	none	negative
J. R.	3-15-49	3-25-49 *	2-6	+
	4-11-49	4-18-49	none	negative
M. M.	3-24-49	3-25-49 *	1-8	+
	4-11-49	4-18-49	none	negative
C. G.	4-11-49	4-18-49	0-10	+
	5- 1-49	5- 6-49	none	negative

* Inoculum was diluted considerably to avoid bacterial growth.

was unknown. Mrs. H.B.'s illness occurred shortly after her dismissal from the hospital where she recently had undergone surgery. H.B. had visited his wife at the hospital on February 17, 18, and 19. Since Mrs. H.B. was not dismissed from the hospital until March 1, she probably was infected by W.P. or H.B. in the hospital. H.B. evidently infected his physician and his son. In his delirium, W.P. twice "escaped" from the hospital and in his wanderings about

the streets, a mass of pus and crusts, he perhaps infected others. W.P. possibly infected J.R. in the hospital where he frequently visited a friend shortly after W.P. was admitted. The source of M.M.'s infection was not determined. A few pustules were found on C.G. when he was jailed for theft of clothing. Stolen clothing possibly was the source of his infection.

This account obviously suggests that some cases of smallpox were missed.

This was all the more likely because of the prevalence of chickenpox at the time, on both sides of the border. There had been some smallpox in the interior of Mexico, but none apparently had been recognized recently near the lower Rio Grande border. In recent years ³ the reported incidence of smallpox in Mexico has declined to remarkably low levels.

THE VACCINATION CAMPAIGN

The Hidalgo County Health Department initiated a mass vaccination campaign at the end of the second week in March. Several vaccination stations were established at schools and other strategic locations both in Hidalgo and Starr Counties. The Hidalgo County Health Department at Edinburg served both as a principal vaccination station and vaccine distribution center. A vigorous vaccination campaign also was pushed by the Cameron County Health Department. At most of the principal vaccination stations the names of persons vaccinated were noted, while elsewhere the number of persons vaccinated was recorded. The services of volunteer workers were utilized in conducting the emergency vaccination program.

Chorioallantoic membrane culture smallpox vaccine ^{4, 5} rather than calf-lymph was utilized. The C.A.M. vaccine was prepared from membranes of embryonated eggs infected with vaccine virus. The infective membrane tissue was finely emulsified and prepared as a 20 per cent tissue suspension using sterile inactivated beef serum as a diluent. The vaccine was tested for safety and potency and dispensed in glass capillary points in the usual manner. In the valley emergency the local health department supplied all local physicians with this vaccine. The current supply of 50,000 points of vaccine was used in a few days. Reserve stock vaccine was quickly filled into the final capillary containers and made ready for distribution. It was estimated that even this

reserve stock would not fully meet the sharp increase in use of the vaccine both in the valley area and in other parts of the state. Local hatcheries were contacted and 3,000 embryonated eggs (age 11 days) were obtained. By thus speeding up the process of manufacture it was possible to have a large supply of vaccine on hand within one week after inoculation of the membranes. A shortage of glass capillary points threatened to become a "bottleneck" in distribution, but fortunately a supply was obtained before it became necessary to dispense the vaccine in bulk state.

At no time was the Hidalgo County Health Department without C.A.M. vaccine, but because of the reduced supply at some of the stations it was necessary to do multiple vaccinations from capillary points containing sufficient vaccine. Approximately 106,000 persons were vaccinated in Hidalgo County, 103,000 in Cameron County, and 30,000 in Starr County. Much of the vaccinating was done in a five-day period between March 13 and 18. Relatively few points of commercial calf-lymph were used, and more than 99 per cent of the vaccinating was done with C.A.M. vaccine.

SEQUELAE

It is known that encephalitis occasionally follows vaccination. A case of encephalitis in a young adult occurred in Hidalgo County early in August. This case had been vaccinated against smallpox in March but this apparently was not significant. A case of encephalitis occurred in Cameron County in November, but this person had not been vaccinated in several years. A case of generalized vaccinia was observed. There were no fatalities attributed to vaccination.

VACCINATION AND IMMUNITY

Numerous vaccinated persons who expected immune reactions had good

TABLE 3

Vaccination Data on Intimate Family Contacts of Cases of Smallpox

Intimate Family Contacts	Primary Vaccination with			Result	Revaccination with C. A. M. Vaccine	Result	
	C. L.*	C. A. M.†	Year			Immune Reaction	Vaccinoid Reaction
G. B.		Yes	1946	Primary "Take"	Yes	Immune Reaction	
D. B.		"	1944	" "	"	Vaccinoid Reaction	
Mrs. J. R.	Yes		about 1922	" "	"	" "	
A. R.		Yes	1944	" "	"	" "	
C. R.		"	1945	" "	"	" "	
O. R.		"	3-12-49	" "	"	" "	
Mrs. X.	Yes		about 1929	" "	"	" "	
Mrs. W. P.	Yes		about 1925	" "	"	" "	

* Commercial calf-lymph smallpox vaccine.

† Chorioallantoic membrane vaccine prepared by the Texas State Health Department.

"takes." While most of the school children in Hidalgo and Cameron Counties had been vaccinated before the outbreak of smallpox, most preschool children and many adults had not been vaccinated. There were many who never had been vaccinated and others who had not been vaccinated in recent years. Of the 8 recognized cases of smallpox, only C.G. had been vaccinated. C.G. had been vaccinated at least 12 years earlier, yet his illness was relatively mild. Because of absence as a result of an accident and illness, B.B. had twice missed vaccination at school. His two older brothers had been vaccinated with C.A.M. vaccine, and despite heavy exposure to smallpox they escaped infection. They were revaccinated before their mother's death. Mrs. X, Mrs. W.P., and Mrs. J.R. had been vaccinated several years earlier. They were revaccinated. The three J.R. children were vaccinated or revaccinated, as shown in Table 3. M.M. was foreman of a labor crew and while he conscientiously saw that all his men were vaccinated he refused vaccination himself because he was sure he "had smallpox several years ago." His illness was not severe and perhaps it was a second attack, as M.M. insisted. It appeared remarkable that many other cases did not result from the contacts with known and unknown cases, particularly in view of the delay in starting the mass vaccination campaign.

DISCUSSION

An outbreak of 8 cases of smallpox was described but it was evident that a few cases were missed. The history of the outbreak showed several similarities to the recent outbreaks in New York City⁶ and Glasgow, Scotland.⁷ In all three outbreaks hospital-acquired infections occurred largely because of early failures to recognize smallpox. In the Texas and the Glasgow outbreaks medical or nursing personnel became infected.

In each of these outbreaks infection of the chorioallantoic membrane of the embryonated egg was utilized as a laboratory aid in diagnosis. The diagnosis of 7 of the 8 cases described was confirmed by laboratory test. It was gratifying that the test appeared to be sensitive, specific and readily applicable with a minimal delay, supporting earlier observations on the value of the test.^{1, 2} In the performance of this test, as in much laboratory work, there is dependence upon submission of satisfactory specimens. Negative tests were obtained frequently with badly desiccated crusts obtained late in the illness. The evidence should be considered with respect to clinical, epidemiological, and laboratory data.

The outbreak of smallpox described following soon after a similar outbreak in New York City emphasized the need for keeping people immunized against

smallpox. Although smallpox vaccination is universally accepted as a protective measure against smallpox, vaccination all too often is neglected. Only one of the 8 cases had been vaccinated. In the heavily populated lower Rio Grande Valley many never had been vaccinated and fewer yet had been vaccinated in recent years. In combating this outbreak, vaccine cultivated in the chorioallantoic membrane of the embryonated egg rather than calf-lymph primarily was utilized. Calf-lymph points comprised less than 1 per cent of the total points used. C.A.M. vaccine has been prepared by the State Health Department and utilized in Texas for several years.⁵ The results obtained in combating the outbreak described appeared to support the impression that C.A.M. vaccine^{4, 5} was an effective immunizing agent. It was also gratifying that, in an emergency, the C.A.M. vaccine could be processed and distributed with a minimal delay.

SUMMARY AND CONCLUSIONS

An outbreak of 8 cases of smallpox with one fatality which occurred in the lower Rio Grande Valley of Texas early

in 1949 was described. The diagnosis of 7 cases was confirmed by cultivation of the virus in the chorioallantoic membrane of the embryonated egg.

The vaccine primarily utilized in combating the outbreak was prepared from the infected chorioallantoic membrane of the embryonated egg. It appeared that the C.A.M. vaccine was an effective immunizing product.

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“Academic training is relatively easy; emotional development is relatively difficult.”—Brock Chisholm, M.D., director general, World Health Organization, speaking at the APHA Annual Banquet, in Cleveland, Ohio, October 23, 1952.