immune status of the host may be determined simultaneously with the oncolytic effect of the virus.

The authors subscribe to the contention of Toolan and Moore(15) that a preliminary determination of viral sensitivity for each tumor should precede any consideration of therapy through viral infection. The tissue culture technic described provides a relatively rapid method of study by which a wide range of viruses can be studied for their effect on each human tumor. By this method, too, new viruses can be surveyed for possible cytopathogenic effect, with the hope that an agent with selective effect on the tumor can be either found or developed.

Summary. Tumor implants, growing in roller tube cultures, demonstrated a marked oncolytic response to St. Louis encephalitis infection. Two human and 2 rodent tumors were destroyed completely by SLE virus, less completely by neurotropic influenza virus. Infections with Lansing poliomyelitis, Newcastle disease, herpes and chick embryo adapted influenza A viruses did not interfere with growth of tissue implants. Rabies virus appeared to stimulate the growth of such tumor implants. The tissue culture technic can be used as a survey tool in rapidly determining the cytopathogenic effect of viral agents on tumors.

1. Levaditi, C., and Nicolau, S., *C. R. Soc. de Biol.,* 1922, v87, 498.
2. Levaditi, C., Schoen, R., and Reinie, L., *C. R. Soc. de Biol.,* 1937, v124, 711.
3. Levaditi, C., and Haber, P., *Revue d. immunol.,* 1937, v3, 5.
4. Haber, P., and Coquoin, M., *C. R. Soc. de Biol.,* 1937, v125, 238.
5. Turner, J. C., and Mulliken, B., *Cancer Research,* 1947, v7, 774.
6. Schoen, R., *C. R. Soc. de Biol.,* 1937, v125, 939.
7. Turner, J. C., Mulliken, B., and Kritzler, R. A., PROC. SOC. EXP. BIOL. AND MED., 1948, v69, 304.
8. Schoen, R., *C. R. Soc. de Biol.,* 1937, v125, 845.
9. Pearce, Louise, and Rivers, T. M., *J. Exp. Med.,* 1927, v46, 81.
10. Moore, Alice E., *Cancer,* 1949, v2, 525.
11. ———, *Cancer,* 1951, v4, 375.
12. Buckley, S. M., Buckley, J. J., and Snipes, A. E., *Cancer,* 1951, v4, 367.
13. Koprowska, I., and Koprowski, H., *Fed. Proc.,* 1952, v11, 420.
14. Sharples, G. R., Davies, M. C., and Cox, H. R., PROC. SOC. EXP. BIOL. AND MED., 1950, v73, 270.
15. Toolan, Helene W., and Moore, Alice E., PROC. SOC. EXP. BIOL. AND MED., 1952, v79, 697.
16. Cameron, Gladys, *Tissue Culture Technique,* Academic Press Inc., New York, 1950, 1-191.
17. Moore, Alice E., *Cancer,* 1949, v2, 516.
18. Robbins, F. C., Enders, J. F., and Weller, T. H., PROC. SOC. EXP. BIOL. AND MED., 1950, v75, 370.

Received May 27, 1952. P.S.E.B.M., 1952, v80.

Effect of Antibiotics on Obstructive Appendicitis in Rabbits.* (19696)

ROBERT W. TOON AND OWEN H. WANGENSTEEN.
From the Department of Surgery, University of Minnesota Medical School, Minneapolis.

Previous work from this laboratory has shown that the cecal appendage of man, the chimpanzee and the rabbit possess a secretory capacity(1,2). When the orifice of the appendix is obstructed the "closed-loop syndrome" accompanied by perforation occurs. In animals in which a secretory capacity cannot be demonstrated, obstruction of the cecal appendage does not lead to perforation(3,4). Recently it has been shown that antibiotics reduce the mortality from appendicitis and its complications in man(5,6).

It seemed desirable to test the effects of antibiotics on the obstructed appendix in the rabbit to ascertain: 1) whether antibiotics reduce the mortality in this animal, and if so 2) whether they exert their effects through reduction in secretion or by other mechanisms.

Experimental procedure. Adult white rabbits of both sexes, weighing 1.8 to 4.3 kg were anesthetized with nembutal-ether and under surgical asepsis the appendicocecal juncture

* This research received support from the following funds: Augustus L. Searle Fund; Austen B. Cargill Fund; G. Nelson Dayton Fund; Graduate School of the University of Minnesota.

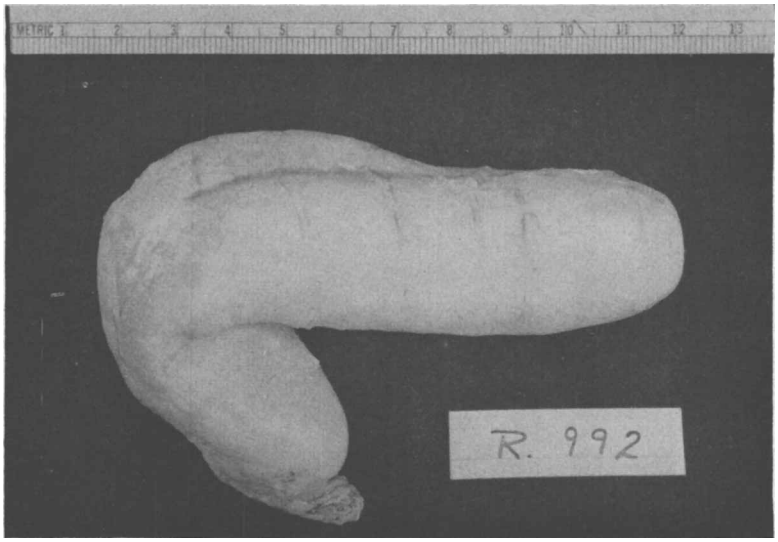

FIG. 1. Parenteral penicillin for 30 days. Large distended appendix resembling a mucocele. No perforation could be found.

was occluded by a silk ligature passed between the gut wall and the blood vessels. The vascular supply to the appendix was undisturbed. The appendical lumen was not emptied. Trauma to the appendix was avoided. A full diet of water and commercial rabbit pellets was offered to all animals immediately after surgery. Control animals received no treatment. Parenteral antibiotics were administered as penicillin in oil 60,000 units twice a day or aqueous streptomycin 0.25 g twice a day in the back muscles beginning 8-12 hours after surgery. Local antibiotics were given as a single dose of aqueous penicillin 50,000 units or aqueous streptomycin 0.5 g each in 2.5 cc of solution deposited in the appendical lumen with a small needle introduced through the cecum. To determine the duration of therapy necessary to insure complete recovery, parenteral antibiotics were discontinued after varying time intervals. If the rabbit survived an arbitrary time of 60 days after cessation of parenteral antibiotics or after instillation of local antibiotics it was considered cured and sacrificed for pathological study. In a separate group of 18 animals the actual volume of fluid secreted by the obstructed rabbit's appendix during parenteral antibiotic therapy was collected intra-abdominally in a thin rubber condom connected to the appendical lumen by a small glass cannula.

Results. Perforation of the appendix with peritonitis or abscess formation was proved at autopsy in all control animals and in 95% of those treated with antibiotics. No perforations occurred at the site of ligature, the majority being in the proximal third. The appendix was usually enlarged 2 to 5 times normal size and resembled a mucocele (Fig. 1). Scattered deposits of firm white material frequently occurred throughout the abdominal cavity. They appeared as well encapsulated masses or as grape-like clusters resembling a pseudomyxoma peritonei. However, microscopic examination showed the appendical contents to be more cellular than mucoid and the scattered masses proved to be abscesses containing 5-50 cc of thick white caseous material. In 3 animals despite marked distention of the appendix, no perforation nor evidence of peritonitis could be found. All ligatures were intact and each lumen completely occluded.

Control. All untreated control animals died within 7 days with appendical rupture and peritonitis.

Penicillin. In contrast to the control animals a comparable group treated with parenteral penicillin all survived the 7-day period and were sacrificed for study. The appendix

TABLE I. Survival after Appendical Ligation.

	No. started	No. alive at end of treatment	No. alive 60 days after treatment
Daily parenteral penicillin			
10 days of treatment	6	6	1
14 " " "	8	6*	1
30 " " "	14	6*	6
Daily parenteral streptomycin			
30 days of treatment	11	6*	4
Local penicillin	6		4
" streptomycin	6		6

* Beyond 10 days of treatment some animals died even though receiving parenteral penicillin or streptomycin at the time.

had ruptured in each. Beyond 10 days of treatment some rabbits died while still receiving treatment (Table I). Ten such animals died from the 11th to the 25th day of therapy. All animals that were maintained on penicillin for 30 days after ligation survived the subsequent 60-day period and appeared to be in good health. With shorter periods of treatment the survival rate was greatly reduced. Of 6 animals treated with local penicillin 2 died in 23 days and 4 lived for at least 60 days.

Streptomycin. Of 6 animals treated with parenteral streptomycin for 30 days, only 4 survived the subsequent 60-day period. Five additional animals died between the 3rd and 15th day of therapy. All animals treated with local streptomycin survived the 60-day period.

Secretion. There was no consistent variation to suggest that the amount secreted during parenteral penicillin therapy (75 to 260 cc) or parenteral streptomycin therapy (90-250 cc) was significantly different from the amount secreted by the control group without therapy (85-270 cc). The volume secreted by individual animals varied considerably and showed no correlation with body weight (Table II). It is of special note that appendical perforation did not occur in these animals.

Summary. The high mortality from perforation and peritonitis which uniformly followed untreated obstruction of the rabbit's appendix was definitely reduced by the parenteral or local administration of penicillin or streptomycin. However, appendical perforation was not prevented nor was there a consistent decrease in the secretion of that organ.

TABLE II. Individual Body Weight and Volume Secreted after Appendical Ligation in 18 Rabbits.

	Control		Parenteral penicillin		Parenteral streptomycin	
Days after obstruction	Wt, kg	Vol, cc	Wt, kg	Vol, cc	Wt, kg	Vol, cc
4	2.7	85	2.5	75	2.7	90
4	2.7	270	2.7	260	2.5	245
5	2.5	245	2.5	250	2.7	190
6	4.1	160	4.3	180	4.1	155
11	2.7	155	2.72	155	2.9	250
12	2.7	205	2.72	190	2.7	215

Therefore the beneficial results of these antibiotics must have been due to other mechanisms, in all likelihood the result of their antibacterial activity. Although the mortality was effectively reduced, some animals died while receiving therapy, an indication that antibiotics are no panacea in the treatment of appendicitis and its complications. The importance of secretory pressure as the principal factor in perforation of the obstructed appendix is emphasized by the fact that such perforation was prevented by allowing the pressure to be dissipated into the reservoir of a distensible balloon.

1. Wangensteen, O. H., and Dennis, C., *Ann. Surg.*, 1939, v110, 629.

2. Dennis, C., Buirge, R. E., and Wangensteen, O. H., *Surgery*, 1940, v7, 372.

3. Wangensteen, O. H., and Bowers, W. F., *Arch. Surg.*, 1937, v34, 496.

4. Buirge, R. E., Dennis, C., and Ritchie, W. P., *Ann. Surg.*, 1937, v106, 910.

5. Crile, G., *Surg., Gynec. and Obst.*, 1946, v83, 150.

6. Brown, M. J., *Am. J. Surg.*, 1947, v73, 56.

Received June 10, 1952. P.S.E.B.M., 1952, v80.