ventricular capacity was 17 cc., while the right ventricle held 14 cc. Dog No. 352, with a 2nd fistula measuring 4 x 2 mm. which had persisted for 40 days (a first, and unsuccessful, fistula had been made 80 days before the 2nd), presented a H.W./B.W. ratio of .01180 which was definitely greatly increased, while the L/R ratio was 1.050. The hypertrophy was thus definitely of the right ventricular type. Dog No. 351, with a carotid jugular fistula 3 x 2 mm. for 143 days, presented the greatest degree of general hypertrophy with a H.W./B.W. of .01250, while the right ventricular predominance was conspicuously indicated by the L/R ratio of 1.000.

We may conclude from these preliminary observations that a relatively high grade of cardiac hypertrophy can be produced and that there is relatively greater right ventricular hypertrophy as a result of arteriovenous aneurysm. The left ventricular capacity was 4 cc. and the right ventricle held 5 cc.

4063

Relative Mechanical Strength of Jejuno-Jejunostomies Performed With and Without Intestinal Clamps.

R. A. CUTTING. (Introduced by Henry Laurens.)

From the Department of Surgery, Tulane University Medical School.

The experiments reported in this communication were undertaken in an attempt to elucidate the rôle played by clamps in post-operative recovery from entero-enterostomies, especially with respect to the comparative mechanical strength of wounds made according to a "clamp" or a "clampless" technique. Twenty-nine dogs were used as experimental animals, of which 26 appear in the final report, one having died on the 2nd post-operative day of general peritonitis, and 2 others, though apparently recovering normally when killed and autopsied on the 4th post-operative day, having shown the presence of a small amount of pus in connection with their enterostomy wounds.

Two enterostomies, one with clamps and the other without clamps, were performed in each animal on the same day, the operative procedures consuming a period from November 9, 1927, to March 29, 1928. Enterostomies were performed in the upper jejunum some 10 inches apart and from 12 to 18 inches from the pylorus. The first enterostomy was performed with clamps in the first 13 animals and the second enterostomy in the second 13 animals;

the other enterostomy in each animal was performed with the aid of "guy sutures".

The animals were killed at intervals of one day in such a manner that each post-operative day, up to and including the 12th day, was represented by 2 animals; this was done in a hit or miss manner, however, in such a way as to bring some of the animals appearing early in the operative series late in the autopsy series, and vice versa.

Four segments of intestine, each about 4 inches in length, were cut from the jejunum of each animal at autopsy, the first being cut from the normal gut just proximal to the first entero-enterostomy, the 2nd including the first enterostomy, the 3rd including the 2nd entero-enterostomy, and the 4th being a segment cut just distal to the 2nd enterostomy. The bursting pressure of these segments was measured by forcing air into them and recording, by means of an attached mercury manometer, the pressure at which they burst.

Taking the series as a whole, the 4th segment (segment of intestine distal to the 2nd enterostomy) averaged slightly more than 7% stronger than the first (segment of intestine proximal to the first enterostomy).

The bursting pressures of both of these segments were averaged for each dog, and this figure was taken as the average bursting pressure of the normal intestine in this region. The average bursting pressure thus computed was found to bear no constant relation to the weight of the animal, some of the smaller animals showing relatively high jejunal bursting pressures, and vice versa. On the whole the jejunum of the female animals seemed to show a slightly higher bursting pressure than did that of the males, though this finding was somewhat inconstant. Bursting occurred most characteristically (three-quarters of the cases) at the antimesenteric border of the segments of normal intestine and was both diffuse and explosive, the rent in the peritoneum being usually of considerably less extent than that of the underlying tunics. Less frequently the rupture occurred at the mesenteric border, and still less frequently at a point intermediate between the 2.

The percentage strength of the 2 enterostomies was computed by dividing their bursting pressures by the bursting pressure of normal intestine as computed above; this was done, of course, separately for each animal. Enterostomies by both methods and on all post-operative days show marked variations in strength, but they were about one-third as strong as normal gut immediately after their performance, progressively decreased in strength for 3 days, then rapidly and progressively rose to, or exceeded the strength of

normal gut on the 10th day, then suddenly decreased on the 11th day to about half-strength, again being on the increase on the 12th day. Entero-enterostomies performed with clamps are somewhat stronger than those performed with guy sutures, especially on the 2nd, 3rd, and 4th days, this being the critical period in repair.

4064

Effect on the Immunity Mechanism of Various Avitaminoses.

S. N. BLACKBERG. (Introduced by Dr. J. T. Halsey.)

From the Department of Pharmacology, Tulane University.

Various authors[1, 2, 3] have shown that avitaminosis increases the susceptibility to both bacterial invasion and to bacterial toxins.

In this laboratory, in several groups of white rats deprived of vitamins A and D, or B, or E, it has been found that the resistance to tetanus toxin, of these avitaminic animals, is very markedly diminished when compared with that of the normally nourished controls (from 40 to 100 times less).

In other series the effect of these avitaminoses on the formation of agglutinins and bacteriolysins was investigated by the usual methods of injecting typhoid bacilli, under constant conditions into avitaminic and control groups.

The results may be briefly summarized as follows:

After several injections of killed typhoid cultures, the serum of the avitaminic animals regularly showed a much lower agglutinin titre and less bacteriolytic power than that of the normally nourished controls. Following the injections of living typhoid bacilli, a similar but slighter difference was found in the serum of the avitaminic and control groups. With the injection of larger amounts of living bacilli it was manifest that this difference became progressively less. This latter finding appears to be well explained by the view that in the living cultures there were present sufficient amounts of the different vitamins to overcome, at least in part, the deficiencies of the diet. The increase in weight and the improvement of general conditions of the avitaminic rats, after receiving these larger amounts of the living cultures, seems to furnish evidence for the

[1] Werkman, C. H., *J. Infect. Dis.*, 1923, xxxii, 247.

[2] Findlay, G. M., *J. Path. and Bact.*, 1923, xxvi, 1.

[3] Findlay, G. M., *ibid.*, 485.