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6505

Experimental Osteochondritis of the Femoral Head.

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The etiology of osteochondritis of the head of the femur has never been proved clinically or experimentally. The theories may be grouped under the headings of infection (Kidner, McWhorter, Phemister), circulatory disturbances (Axhausen, Leriche and Policard, Bentzon, Zeimansky and Lipmann), and mal-development (Calot and Mürk Jansen). The second of the theories seemed the most likely, consequently it was tested by experiments in dogs and rabbits in which the circulation of the head of the femur was interfered with, and the bony changes were noted from time to time, to see if they might similate those of the human disease known as osteochondritis (Legg-Calvé-Perthe's disease).

Seven dogs from 2 to 4 months old and 16 rabbits from 2 to 3 months old were divided into 4 groups. They were operated upon aseptically and 4 different degrees of interruption of the vascular supply of one femoral head instituted. Roentgenograms were made shortly after the operation and at the time of the autopsy. Autopsies were performed at periods varying from 2 weeks to 4½ months after operation. Cultures were taken from the hip joints operated upon, and the upper ends of both femurs were removed for gross and microscopic study. Group I. Two dogs and 4 rabbits. The round ligament of one hip joint was severed. All of the animals treated with this method developed dislocation of the operated hip within one month and, therefore, were discarded. Those treated by the other methods did not present this complication. Group II. Three dogs. Alcohol was injected into the periosteum of the neck of the femur. Gross and microscopic examination of the specimens showed that the bone and cartilage of the femoral head remained

normal. Group III. Four rabbits. Alcohol was injected into the periosteum of the femoral neck; the periosteum was stripped from the entire neck of the femur. Microscopic sections showed nothing of importance except for a few small areas of aseptic necrosis of the bone. Apparently, the circulatory embarrassment caused only a limited necrosis, reparable without gross changes in the head. Group IV. Eleven rabbits. The round ligament ligated with a silk suture; the periosteum stripped from the entire femoral neck; silk suture placed around neck. In one dog (10 weeks) the femoral head appeared normal grossly but in all others it was greatly roughened and flattened. Microscopically in all cases, the bone and cartilage of the head were uniformly and markedly atrophied and, in many areas, necrotic. Of particular interest were well defined cystic spaces which represented areas of degeneration of the medullary bone and of the marrow tissues. As early as 2 weeks after operation, new vessels were seen growing from the shaft along the surface of the neck and the necrotic areas were found to be undergoing repair.

It is concluded that the circulatory deficiencies of the head of the femur produced in Group IV caused gross and microscopic changes similar essentially to those of the human lesions of osteochondritis. It seems probable that the dog in Group IV without flattening of the femoral head would have developed that deformity if it had been kept alive a little longer, since the collapse in the other cases was very probably due to weakening of the internal structure and weight-bearing.

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Acidosis in Cholera. I. Path of Displacement of Serum Acid Base Equilibrium.

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During the outbreak of cholera in the summer of 1932 we had the opportunity of studying 28 cases from the standpoint of their serum acid-base equilibrium. With the micro-acid-base method of Shock and Hastings,[1] cell volume, pH, and total CO_2 of blood were

[1] Shock, N. W., and Hastings, A. B., PROC. SOC. EXP. BIOL. AND MED., 1929, **26**, 780.