BLOOD PRESSURE WITHIN THE CORPUS CAVERNOSUM PENIS OF THE BULL*

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It is generally considered that the erection of the penis is produced by a combination of elevated arterial pressure, restricted venous return and relaxation of the walls of the cavernous spaces. A mechanism to produce erection in bulls and rams (Watson, 1964) was proposed from anatomical studies. Under the stimulus of sexual excitement, the ischio-cavernosus muscle contracts, compressing the crura and forcing blood into vessels of the corpus cavernosum penis (c.c.p.). The muscle then relaxes to allow blood from the deep artery to refill the spaces of the crura. This sequence is repeated until pressure in the c.c.p. equals that of the artery. A similar mechanism has been described for the dog (Henderson & Roepke, 1933). Since the pressure within the c.c.p. would have a bearing upon the mechanism of erection as well as certain conditions often seen in breeding bulls (i.e. rupture of the penis), the level of pressure was investigated.

The blood pressure within the c.c.p. was measured with a linear core pressure transducer (E & M Instrument Co., Houston, Texas) calibrated from 0 to 50 lb/sq. in. or 0 to 2585 mm Hg with a dead weight hydraulic tester and this calibration was correlated with a mercury manometer. For comparison, pressures were measured during natural erection and erection produced artificially by stimulation with an electro-ejaculator. The pressure was measured during natural erection by means of a plastic catheter surgically implanted in the c.c.p. posterior to the sigmoid flexure. The catheter was retained by a small stay suture in the tunica albuginea. For measurement during artificially produced erection, a needle with a pressure catheter attached was inserted into the c.c.p. approximately 6 in. posterior to the glans penis.

In both instances, the recorded pressures far exceeded systemic arterial pressures and a level the blood vessels could withstand before rupturing. A peak pressure of 42 lb/sq. in. (2172 mm Hg) was measured during natural erection with a mean of 33·4±6·1 lb/sq. in. (1727±282 mm Hg) for five determinations. Five determinations recorded during artificial erection had a mean pressure of 32±2·7 lb/sq. in. (1655±1422 mm Hg). The systolic arterial pressure was determined to be 3 to 4 lb/sq. in. (150 to 200 mm Hg) during erection, with no increase in pressure corresponding to the levels in the corpus

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cavernosum penis during erection. Text-fig. 1 is a recording of pressures obtained from systemic arterial circulation, artificial erection and natural erection and ejaculation.

The pressures recorded were greatly in excess of those one might expect and so the pressure transducer was recalibrated after the series of tests. The calibration showed no change in the accuracy of the transducer. In addition to the recalibration a 2400-mm mercury manometer was used to measure penile pressure during artificial erection. The readings with the manometer verified the data taken with the transducer. A peak pressure of 1880 mm Hg was recorded with the manometer in this series of tests.

The exact mechanisms responsible for this very high pressure or the means by which it is prevented from backing into the systemic circulation are not known at this time. Additional investigations are being conducted in this area.

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REFERENCES
