XLVII.

RELATION OF BLOOD PRESSURE TO PATHOLOGIC CONDITIONS OF HEAD AND NECK.*

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While the study of blood pressure variations in pathologic conditions of the heart and circulatory system has been used by the internist routinely for some years, it is only recently that those doing special lines of medical practice have resorted to its use as an aid in their work.

Our attention was called to its value in the first place in connection with vesicular lesions, and further use has convinced us that it should be used as a routine measure in every case. The reasons for this would seem at first to be few, and it would be found less frequently necessary in well regulated hospitals where our patients had been subjected to thorough examinations before coming to our hands. This, however, unfortunately, cannot be, or is not the case with more than a small percentage of our cases, and it behooves us to protect ourselves by making such tests as may also protect our patients.

I have found very little in the literature devoted to blood pressure which even mentions diseases of the nose, throat or ears, except in a general way.

It may not be out of place to give concisely the method usually employed in taking the blood pressure, although we have for the last three years employed the coagulation test, and taken the blood pressure in surgical cases before operation, we have developed nothing particularly new in the technic. The following is the method usually employed and the precautions to be observed, according to Faught:

Suggestions to Be Followed and Precautions to Be Observed While Using the Sphygmomanometer.—Position of the pa-

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tient: Whether the observation is made in the reclining or sitting posture will be determined by the nature of the case and by exigencies of practice. In the critically ill, the horizontal posture is preferable, although it will not always be found convenient or possible in the presence of orthopnea, while in ambulatory cases it will not always be found convenient to employ the horizontal. One point to be borne in mind is that for purposes of comparison it is essential, whenever possible, to make all subsequent observations in a case in the same posture as was at first. At all events, the location of the arm band, irrespective of the patient's posture, should be at the heart level, thus eliminating the error due to gravity. Under all circumstances the patient should be in a comfortable position and one favoring muscular relaxation.

Application of Cuff.—The cuff is usually applied to the arm above the elbow and should be maintained at the heart level. It should be applied directly to the bare arm or over very thin coverings, and wrapped firmly. This will avoid the unnecessary delay required to fully inflate a loosely applied arm band. The arm band should not exert pressure. This point is also of importance in using any method other than the auscultatory, since the grade of the volume of confined air, the less marked will be the rhythmic impulse transmitted to the manometer.

Time of Observation.—Whenever possible, observation should be made at about the same time of day and in the same relation to the taking of food. Observations should not be made during periods of excitement or after exercise or in periods of profound fatigue, neither after the injection of large amounts of fluid or of stimulants, as tea, coffee or alcohol. An overheated or unduly chilled extremity will affect the arterial pressure in the part. Observations made under pathologic conditions such as edema or spasms are absolutely unreliable.

Fear and psychic disturbances markedly influence the readings; for this reason, in the nervous and excitable, the initial reading is often higher than those made subsequently.

Condition of Indicator and Cuff.—A leaky apparatus will give unreliable readings; old rubber parts are often responsible for this. When properly connected the apparatus should

be able to sustain the mercury column without receding. A rapid fall indicates a leak somewhere in the air system and should be corrected. At the beginning of each test the indicator, irrespective of type, should register zero, and in the mercury instruments the mercury column should not be broken. This latter condition may be overcome by abruptly jarring the apparatus until the mercury unites.

The Performance of the Test.—The greatest rapidity compatible with accuracy is essential, since undue delay while the arm is under compression will, through vasomotor influences, give a disagreeable sensation and may also affect the systolic pressure. Two or more readings should be made, whenever possible, for purposes of verification, to eliminate psychic and other transitory sources of variation, and no single observation should be accepted when it is possible to make additional ones.

The Keeping of Records.—Whenever possible blood pressure records should be preserved. This not only makes for accuracy in individual readings, but also furnishes valuable data for comparison, not only in the same case, but also in statistical studies. For this purpose a card is employed upon which individual daily records are made and filed, and from which, when desired, graphic charts are easily compiled.

The Scope of the Test.—The clinical determination of blood pressure involves an estimation of the systolic and diastolic pressures, from which may be determined the pulse pressure and the mean pressure. The value of the observation is enhanced if the pulse rate is recorded as a part of this examination.

Any peculiarities noted either while palpating the pulse or in variations from normal in the series of sounds heard during auscultation of the vessels should be recorded. Valuable supplementary information may be developed through a careful consideration of these factors.

While the palpatory method has been used in most of the cases reported by us, we use the auscultatory in many, and while the latter is acknowledged to be the most accurate, we feel that the former has given us much valuable information

in many cases. The other methods not being used frequently, except the graphic, which is essentially a laboratory aid and method for experimental cases and requiring much apparatus, and will only be mentioned.

The Visual and Oscillatory.—Mention has been made by a number of authors in using the auscultatory method of the use of a small bell to the stethoscope. This was found to be especially necessary in a number of very small children examined for me by Dr. Fleming in the Children's Hospital. (Instruments used were Faught and Tycos.)

The reason we do not have more accidents due to high pressure in our operative cases is probably because of the fact that before all operations the patient is purged, and according to the observations of Neilson and Hyland, especially in the study of the effect of magnesium and sodium sulphate, sodium tartrate, and compound jalap powder in the usual therapeutic doses.

The systolic pressure was tested in one hundred and twenty-six patients, of whom one hundred and nine showed a lowering of the systolic pressure varying from five to thirty-five per cent. Twelve showed practically the same blood pressure throughout the experiment. Five showed an increase during the experiment. Twenty-four hours after the cathartic was given, forty-eight had a systolic from five to eighteen per cent lower than before the cathartic was given. Twenty-six had practically the same as at the beginning. Only those who remained in bed were tested twenty-four hours afterward. The action of the different cathartics was practically the same, except that the compound jalap produced a more constant and greater lowering than the others. They also showed in most instances quite a decided lowering at the end of twenty-four hours. It was found in this set of experiments that those individuals with a systolic pressure of 140 and above, the highest test being 190, gave an average lowering of 23 millimeters Hg. Fifty-seven individuals, with a pressure from 110 to 140, gave an average lowering of 13 millimeters Hg., while thirty-four individuals, with pressure of 110 or lower, gave an average lowering of 7 millimeters Hg.

A study of systolic, diastolic and pulse pressures and the rate of heart beat was made on sixty-eight individuals.

Percentage lowering of the systolic pressure in this number, taken as a whole, was seventeen per cent.

The diastolic pressure was lowered eight per cent. The pulse pressure was decreased twenty-four per cent.

The number of heart beats as a whole were decreased fourteen per cent. Fifty-six patients showed a decrease, nine showed an increase, and five showed no change.

If we examine these results, we find that an average lowering for all cases is 18 millimeters Hg. The average lowering for those who had initial pressures ranging from 140 to 190 was 23 millimeters Hg.

Those individuals who had a low initial pressure lowered only 7 millimeters Hg.

For instance, one fell from 180 to 100; another from 170 to 120; another from 190 to 115; another from 120 to 80; another from 108 to 78, etc. It is in these extreme results that we most frequently find the developments of an arrhythmia or the increase of an arrhythmia already present.

The result of this set of experiments, supported by the clinical facts that patients with diseased hearts may become worse on brisk catharsis, warrants the assumption that all cases, in which severe purging is used for depletion of the blood, ought to be controlled by watching carefully the blood pressure, heart beats, and regularity, and the general condition of the patient.

The control of bleeding as well as the lack of pathologic heart symptoms due to high pressure, may in many cases be due to withholding water before operation and the subsequent laxity of blood vessels on account of lessened fluid.

Hemorrhages from the nose and throat should not be a cause of alarm unless the pressure drops suddenly, and in many cases should be cause for rejoicing.

Briggs reports a case of intracranial hemorrhage, with a blood pressure of 400 millimeters Hg. While we cannot report a case with this pressure, one of the first cases to impress the value of the estimation of blood pressure, in our work, was a nasal hemorrhage.

Patient, woman, sixty-five years old, had been suffering from nasal hemorrhage for about an hour and fifteen to thirty minutes, when the author arrived. As pulse seemed full,

pressure was taken and found to be 296 millimeters Hg. systolic. Judging from this that she had simply, by good fortune, escaped intracranial hemorrhage, she was allowed to bleed, the pressure being taken frequently for about one and one-half hours, when hemorrhage ceased, with blood pressure at 190 millimeters Hg. There has not been a recurrence, and patient is in apparent good health. Three and one-half years have elapsed since this experience, and it has been our practice since to take the blood pressure in every case of nasal hemorrhage before attempting any method of control by local means.

A case seen recently with a history of considerable bleeding for three days (a young man of twenty-two years), and on examination bleeding had ceased, although a large clot was removed from the left nostril. Blood pressure was 128 millimeters Hg. systolic. Thirty-six hours later the pressure was 155 millimeters Hg. Twenty-four hours later, 138 millimeters Hg.

Our ear examinations are not complete today without recording the blood pressure, as we may find in otitis media chronica cases, especially those with tinnitus, a lower blood pressure with less frequently a high, and in a very small percentage, normal.

Our observations in children have been very interesting, and in many cases, especially those referred for tonsillectomy, we have been able to suggest a possibility of pathology in remote organs to the internist. The tables may be of interest:

Age.	Coagulation	Hemoglobin	B. Pres.
5 yrs.	2m.	90%	76
11	1m. 40s.	75%	88
20	2m. 10s.	75%	118
23	1m. 15s.	80%	112
10	1m. 10s.	75%	96
8	2m.	75%	80
24	55s.	75%	108
32	1m. 5s.	75%	118
19	1m. 50s.	75%	120
23	45s.	85%	118
45	1m. 35s.	85%	113
3	2m. 15s.	75%	52

Age	Coagulation	Hemoglobin	B. Pres.
2	1m. 30s.	75%	
23	1m. 5s.	85%	116
13	1m. 25s.	85%	102
23	1m. 10s.	85%	115
5	1m. 55s.	65%	59
8	2m. 15s.	75%	79
23	1m. 20s.	75%	104
15	1m. 35s.	85%	108
35	1m. 10s.	75%	120
7	1m. 45s.	65%	82
3	2m. 5s.	80%	54
12	2m. 45s.	85%	74
6	1m. 45s.	65%	64
36	1m. 38s.	75%	117
24	1m. 45s.	75%	110
12	2m. 5s.	65%	96
10	1m. 10s.	80%	78
17	35s.	80%	110
10	2m. 15s.	80%	92
40	1m. 30s.	80%	115
26	2m.	80%	110
7	1m. 40s.	80%	82
31	1m. 28s.	75%	90
14	1m.	70%	92
10	1m. 50s.	60%	92
12	1m. 15s.	65%	90
4	2m.	70%	60
11	2m. 30s.	65%	80
26	1m. 20s.	75%	118
33	1m. 30s.	75%	106
20	1m. 15s.	75%	116
20	1m. 58s.	75%	115
32	30s.	75%	120
24	1m. 20s.	80%	110
21	50s.	75%	104
12	2m. 10s.	80%	92
25	1m. 45s.	65%	102
13	1m. 37s.	80%	112
29	1m. 15s.	65%	103

Age	Coagulation	Hemoglobin	B. Pres.
28	45s.	80%	125
6	2m. 5s.	80%	91
28	2m. 40s.	80%	110
17	1m. 30s.	85%	108
3	2m. 10s.	65%	64
44	30s.	85%	130
33	1m. 20s.	75%	108
8	1m. 30s.	85%	85
13	1m. 35s.	70%	100
20	1m. 15s.	85%	112
21	1m. 5s.	85%	105
22	2m. 25s.	90%	120
9	1m. 5s.	60%	78
45	1m. 5s.	75%	134
13	1m. 15s.	65%	90
35	50s.	85%	120
4	1m. 35s.	75%	84
15	25s.	80%	102
6	55s.	85%	98
31	55s.	85%	122
22	1m. 5s.	85%	110
19	1m. 50s.	85%	116
50	50s.	75%	118
7	2m. 45s.	75%	106
6	1m.	80%	98
8	1m. 30s.	80%	65
7	55s.	90%	70
5	1m. 10s.	80%	65
26	2m. 15s.	75%	120
18	2m.	75%	118
16	30s.	85%	118
20	25s.	85%	98
26	40s.	75%	110
16	3m.	75%	84
12	1m. 40s.	85%	94
33	1m. 40s.	85%	114
22	1m. 40s.	75%	112
4	1m. 45s.	70%	64
5	1m. 40s.	75%	60

Age	Coagulation	Hemoglobin	B. Pres.
7	3m. 10s.	70%	70
2	2m. 45s.	70%	
7	1m. 20s.	55%	70
7	2m. 20s.	85%	72
		Sys.	Dias.
7 yrs.		90	40
12		120	75
18		130	60
8		105	85
8		110	60
13		130	50
11		105	60
10		130	70
5		80	50

Average age, $17\frac{1}{2}$ years. Average coag., 2m. 1s. Average
H. G., $76\frac{3}{4}\%$. Average B. P., 95.