

THE VALUE OF BLOOD-PRESSURE DETERMINATION IN THE DIAGNOSIS OF ANEURYSM OF THE THORACIC AORTA.

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THE experience of most clinicians will, I think, be in agreement that in a large proportion of cases of aneurysm of the thoracic aorta it is impossible by digital examination to detect a difference between the pulses on the two sides, either as regards their volumes or the time of their occurrence. For this reason it seemed to me worth while determining whether instrumental examination would lead to a similar result¹ in regard to a difference of arterial blood pressure between the two sides. Accordingly I investigated this point in 30 cases of aneurysm, the observations being limited to cases in which the arch or ascending portion of the aorta or the innominate artery was involved, because it is among these cases of aneurysm only that one would look for differences between the pulses on the two sides. For purposes of comparison I examined the same point in other series—viz.: (1) cases in which there were the clinical signs of mere dilatation of the ascending part or arch of the aorta; (2) cases either of arterio-sclerosis without signs of dilatation of the aorta or else of mediastinal tumour; and (3) cases in which there were no signs of any of these pathological conditions. The first two of these series were chosen as including the conditions other than aneurysm most likely to yield a difference of pressure on the two sides,² and from which perhaps more frequently than any others thoracic aneurysms require to be diagnosed. The diagnosis of practically all the cases of aneurysm and of dilated aorta, when not confirmed by necropsy, rested not solely on my own opinion but were confirmed by the physicians under whose care the patients were, and in the case of my own out-patients by one or other of my colleagues. Personal equation in the diagnoses was thus so far as possible eliminated. The average systolic and diastolic pressure was calculated for all the cases of aneurysm and also for those of dilatation of the aorta in order to institute a comparison between these two conditions. In every case the mean of all the observations made was taken so as to form the basis for calculation of these results.

Details of method of investigation.—The instruments used were Stanton's blood-pressure instrument and Oliver's hæmo-dynamometer (his original instrument). The former³ gives both systolic and diastolic pressures in the brachial artery by the method of circular compression of the limb; the point at which the pulse reappears on relaxing the pressure after the obliteration of the pulse shows the systolic and the point of maximum oscillation⁴ the diastolic pressure. The latter instrument records the diastolic pressure (shown by the point of maximum oscillation of the indicator) in the radial.⁵ Inasmuch as Stanton's instrument gives more reliable results than Oliver's, for von Recklinghausen has proved experimentally that with an armlet of a certain width the Riva Rocci method gives accurate readings of systolic pressure, the results obtained by Oliver's instrument alone⁶ are

¹ After commencing this work I read the following statement: "One of the most important signs of thoracic aneurysm is difference in the radial pulse, which is often strikingly shown by the sphygmomanometer when palpation alone is uncertain." ("The Value of an Accurate Knowledge of Arterial Blood Pressure to the Clinician," by J. B. Briggs, M.D., and H. W. Cook, M.D., Maryland Medical Journal, January, 1903.) I have, however, been unable to find any records of work done in this direction.

² It is said that differences of pressure in the two radials are common in old people, probably as the result of senile arterial changes in the larger vessels. ("A Review of Recent Work upon Blood-pressure," by J. M. Cowen, M.D., The Practitioner, August, 1904, p. 229.)

³ Modified from Riva Rocci's instrument.

⁴ Howell and Brush have shown that this corresponds to the diastolic pressure (Boston Medical and Surgical Journal, August 8th, 1901).

⁵ One occasionally meets with a case in which, owing to the thickness of the tissues superficial to the radial artery, this instrument cannot be used.

⁶ In my earlier observations Oliver's instrument and the pocket sphygmometer of Hill and Barnard only were employed. The results obtained with the latter, though as a rule agreeing roughly with the others, were found to be untrustworthy, so have been omitted from this paper. For these observations see Archives of the Middlesex Hospital, 1905, vol. vi

given separately from and after those in which Stanton's instrument was employed. The wrists when Oliver's instrument was used and the arms when Stanton's was employed were kept at the same level (that of the heart), so as to eliminate the disturbing influence of gravity and for the different observations the patient was so far as possible in the same position, usually that of recumbency. In the earlier observations with Stanton's and in all those with Oliver's instrument corresponding observations on the two sides were separated by as short an interval of time as possible. Latterly, however, at the suggestion of my colleague, Dr. O. F. F. Grünbaum, I have used a modification of the apparatus by means of which the systolic readings on the two sides are made practically simultaneously. In this, by means of two armlets connected with the mercury reservoir of Stanton's instrument by a T piece and tubing, both brachials are simultaneously compressed. If the blood pressures on the two sides be unequal the reading given when the pulse reappears gives the systolic pressure on that side at which it reappears, and on still further reducing the pressure the reappearance of the other pulse will likewise give the corresponding pressure. If, on the other hand, the pressures on the two sides be equal, the pulses will, of course, reappear simultaneously.

Conclusions.—1. The arterial blood pressure in most cases of aneurysm of the thoracic aorta or innominate is either normal or slightly above normal. It is as a rule, however, much higher in cases of mere dilatation of the aorta, and this fact is of some value in the differential diagnosis of these two conditions.

2. A distinct difference (at least five millimetres) between the arterial blood pressures in the two arms is the rule in the majority, and in about the same proportion of cases, on the one hand, of both aneurysm of the arch or ascending portion of the aorta and aneurysm of the innominate and, on the other, of dilatation of the aorta; and a marked difference (at least ten millimetres) is equally common in both. Such differences are therefore of no value in the differential diagnosis between these conditions. A great difference (at least 20 millimetres) seems to be likewise about equally common in these two classes of case, but a difference of upwards of 30 millimetres speaks strongly in favour of aneurysm as against mere dilatation of the aorta.

3. Whilst distinct (at least 5 millimetres) or marked (at least 10 millimetres) differences are the rule in a far larger proportion of cases of aneurysm of the arch or ascending portion of the aorta or innominate than in cases, on the other hand, of arterio-sclerosis or mediastinal tumour, yet such differences are sufficiently frequent in the latter conditions to lead to the conclusion that their presence in a particular case affords but little help in the differential diagnosis between these conditions on the one hand and aneurysm of the arch or ascending portion of the aorta or innominate on the other. Differences of pressure between the two sides greater than 20 millimetres afford, however, strong evidence in favour of aneurysm of the arch or ascending portion of the aorta as against the two other conditions.

4. A distinct difference between the pressures on the two sides is the exception in cases where none of the above pathological conditions are present.

5. Digital examination of the pulses in cases of aortic aneurysm is a far less sensitive method than instrumental, frequently gives results directly at variance with those obtained by the latter means, and hence is of much less value in diagnosis.

Analysis of results.—In the analysis of results here given the readings of systolic pressure obtained by Stanton's instrument are used as the basis of comparison, inasmuch as the diastolic readings are from the nature of the method less accurate. Those observations in which Stanton's instrument was not used but in which Oliver's was employed are dealt with separately as less importance is attached to them.

Observations in which Stanton's instrument was employed: comparison of pressures on the two sides.—In 13 of the 20 cases of aneurysm a majority of observations showed a difference of pressure between the two sides of at least five millimetres, and five of the 20 a difference of pressure between the two sides of at least 10 millimetres. Further, in nine out of the 12 cases of dilated aorta a majority of observations showed a difference of pressure between the two sides of at least five millimetres, and four of the 12 a difference of pressure between the two sides of at least 10 millimetres. On the other hand, in the cases of arterio-sclerosis and mediastinal growth, only 10 of the 21 cases showed in a majority of observations a difference of pressure

TABLE I.—RESULTS FOR WHICH STANTON'S INSTRUMENT WAS EMPLOYED.*
Series I.—Cases of Aneurysm.

No. of case.	St. R. max.	L. max.
	Mm.	Mm.
No. 1.—A male,† aged 45 years. Aneurysm of the arch of the aorta 22/1/06...	115	105
Digitally right radial pulse of higher tension than left 29/1/06...	105	115
Digitally right radial pulse of higher tension than left 9/2/06...	125	119
Digitally right radial pulse of higher tension than left 15/2/06...	125	125
Digitally right radial pulse of higher tension than left 19/2/06...	121	127
Digitally right radial pulse of higher tension than left 19/2/06...	114	122
Digitally right radial pulse of higher tension than left 19/2/06...	118	122
Digitally right radial pulse of higher tension than left 19/2/06...	124	129
No. 2.—A male, aged 31 years. Aneurysm of innominate artery 25/1/06...	108	110
Digitally no difference between radial pulses 2/3/06...	102	125
Digitally no difference between radial pulses 2/3/06...	105	114
No. 3.—A male, aged 53 years. Aneurysm of arch of aorta 26/1/06...	129	147
No. 4.—A male, aged 51 years. Aneurysm of arch of aorta.		
Digitally no difference between radial pulses 24/1/06...	125	114
Digitally radial and carotid pulses equal on the two sides 21/2/06...	122	117
Digitally radial and carotid pulses equal on the two sides 21/2/06...	131	116
No. 5.—A male, aged 40 years. Aneurysm of arch of aorta. (Diagnosis confirmed by necropsy.)		
Digitally radial pulses equal 31/1/06...	128	119
Digitally radial pulses equal 10/2/06...	102	106
Digitally radial pulses equal 10/2/06...	115	115
Digitally radial pulses equal 16/2/06...	124	126
Digitally radial and carotid pulses on the two sides equal 6/3/06...	130	130
Digitally radial and carotid pulses on the two sides equal 6/3/06...	103	103
Digitally radial and carotid pulses on the two sides equal 6/3/06...	103	108
No. 6.—A female, aged 57 years. Aneurysm of innominate artery.		
Digitally right radial pulse of higher tension than left 24/1/06...	205	204
Digitally right radial pulse of higher tension than left 7/2/06...	191	192
Digitally right radial pulse of higher tension than left 13/2/06...	182	179
Digitally right radial pulse of higher tension than left 21/2/06...	172	175
Digitally right radial pulse of higher tension than left 21/2/06...	161	160
Digitally right radial pulse of higher tension than left 9/3/06...	182	171
Digitally right radial pulse of higher tension than left 16/3/06...	173	160
Digitally right radial pulse of higher tension than left 23/3/06...	159	154
Digitally right radial pulse of higher tension than left 23/3/06...	163	169
Digitally right radial pulse of higher tension than left 5/4/06...	143	129
Digitally right radial pulse of higher tension than left 19/4/06...	132	142
Digitally right radial pulse of higher tension than left 19/4/06...	143	146
No. 7.—A male, aged 46 years. Aneurysm of arch of aorta		
Digitally radial and carotid pulses on the two sides equal 14/2/06...	182	187
Digitally radial and carotid pulses on the two sides equal 21/2/06...	162	172
Digitally radial and carotid pulses on the two sides equal 28/2/06...	164	172
Digitally radial and carotid pulses on the two sides equal 28/2/06...	168	158
No. 8.—A male, aged 42 years. Aneurysm of arch of aorta. (Diagnosis confirmed by necropsy.)		
Digitally right radial pulse of slightly higher tension than left. Carotid pulses equal 7/5/06...	99	114
No. 9.—A male, aged 49 years. Aneurysm of arch of aorta.		
Digitally left radial and carotid pulses markedly larger than corresponding right ones 19/6/06...	73	148
Digitally left radial and carotid pulses markedly larger, and radial of higher tension than corresponding right ones 25/6/06...	103	160
Digitally left radial and carotid pulses markedly larger, and radial of higher tension than corresponding right ones 12/3/07...	86	125
Digitally left radial and carotid pulses markedly larger, and radial of higher tension than corresponding right ones 12/3/07...	86	122
Digitally left radial and carotid pulses markedly larger, and radial of higher tension than corresponding right ones 21/3/07...	80	122
Digitally left radial and carotid pulses markedly larger, and radial of higher tension than corresponding right ones 21/3/07...	60	132
No. 10.—A male, aged 33 years. Aneurysm of arch of aorta... .. 27/9/06...	130	110
Digitally radial and carotid pulses on the two sides equal 4/10/06...	124	119
Digitally radial and carotid pulses on the two sides equal 4/10/06...	122	118
No. 11.—A male, aged 50 years. Aneurysm of arch of aorta.		
Digitally radial and carotid pulses on the two sides equal 12/10/06...	137	145
Digitally radial and carotid pulses on the two sides equal 12/10/06...	134	144
Digitally radial and carotid pulses on the two sides equal 19/10/06...	118	104
Digitally radial and carotid pulses on the two sides equal 19/10/06...	115	103
Digitally radial and carotid pulses on the two sides equal 26/10/06...	119	105
Digitally radial and carotid pulses on the two sides equal 26/10/06...	105	119
Digitally radial and carotid pulses on the two sides equal 26/10/06...	112	114
Digitally radial and carotid pulses on the two sides equal 26/10/06...	105	113
Digitally radial and carotid pulses on the two sides equal 2/11/06...	118	120
Digitally radial and carotid pulses on the two sides equal 2/11/06...	110	112

TABLE I.—RESULTS FOR WHICH STANTON'S INSTRUMENT WAS EMPLOYED.
Series I. (Continued).—Cases of Aneurysm.

No. of case.	St. R. max.	L. max.
	Mm.	Mm.
No. 12.—A male, aged 45 years. Aneurysm of arch of aorta. (Diagnosis confirmed by necropsy.)		
Digitally right radial pulse larger and of higher tension than left one. Right carotid pulse larger than left one 9/8/06 ...	148	150
Digitally right radial pulse of much higher tension than left, and right carotid pulse larger than left 11/10/06...	149	154
Digitally right radial pulse of much higher tension than left; right carotid pulse larger than left 12/10/06...	156	153
Digitally right radial pulse of much higher tension than left; right carotid pulse larger than left 12/10/06...	149	145
Digitally right radial pulse of much higher tension than left; right carotid pulse larger than left 12/10/06...	145	143
Digitally right radial pulse markedly larger than left one, and right carotid pulse larger than left 18/10/06...	137	147
Digitally right radial pulse markedly larger than left one, and right carotid pulse larger than left 18/10/06...	151	143
Digitally right radial pulse markedly larger than left one, and right carotid pulse larger than left 25/10/06...	126	133
Digitally right radial pulse markedly larger than left one, and right carotid pulse larger than left 25/10/06...	142	132
Digitally radial and carotid pulses on right side feel much larger than corresponding ones on left 1/11/06...	116	105
Digitally radial and carotid pulses on right side feel much larger than corresponding ones on left 1/11/06...	119	115
Digitally radial and carotid pulses on right side feel much larger than corresponding ones on left 8/11/06...	115	114
Digitally radial and carotid pulses on right side feel much larger than corresponding ones on left 8/11/06...	113	112
No. 13.—A male, aged 58 years. Aneurysm of arch of aorta.		
Digitally left radial pulse much smaller than right. Left carotid pulse smaller than right 13/10/06...	127	135
Digitally left radial pulse much smaller than right. Left carotid pulse smaller than right 13/10/06...	135	138
No. 14.—A male, aged 54 years. Aneurysm of arch of aorta.		
Digitally radial and carotid pulses on the two sides equal 26/10/06...	140	139
Digitally radial and carotid pulses on the two sides equal 26/10/06...	141	133
No. 15.—A female, aged 45 years. Aneurysm of arch of aorta.		
Digitally right radial pulse much larger than left. Carotid pulses equal 9/11/06...	128	127
Digitally right radial pulse much larger than left. Carotid pulses equal 9/11/06...	124	128
Digitally right radial pulse larger and of higher tension than left. Carotid pulses equal 16/11/06...	132	125
Digitally right radial pulse larger and of higher tension than left. Carotid pulses equal 16/11/06...	125	125
No. 16.—A male, aged 64 years. Aneurysm of arch of aorta.		
Digitally right radial pulse larger and of higher tension than left. Right carotid pulse larger than left 10/1/07...	143	137
Digitally right radial pulse larger and of higher tension than left. Right carotid pulse larger than left 10/1/07...	133	123
Digitally right radial pulse rather larger and of higher tension than left. Right carotid pulse larger than left 17/1/07...	148	153
Digitally right radial pulse rather larger and of higher tension than left. Right carotid pulse larger than left 17/1/07...	149	145
Digitally right radial pulse rather larger and of higher tension than left. Right carotid pulse larger than left 15/2/07...	146	153
Digitally right radial pulse rather larger and of higher tension than left. Right carotid pulse larger than left 15/2/07...	140	153
No. 17.—A male, aged 51 years. Aneurysm of arch of aorta.		
Digitally left radial pulse smaller and of lower tension than right. Left carotid pulse (?) smaller than right 4/3/07...	122	122
Digitally left radial pulse smaller and of lower tension than right. Left carotid pulse (?) smaller than right 4/3/07...	125	122
Digitally left radial pulse smaller and of lower tension than right. Left carotid pulse (?) smaller than right 6/3/07...	111	104
Digitally left radial pulse smaller and of lower tension than right. Left carotid pulse (?) smaller than right 6/3/07...	119	100
Digitally left radial pulse smaller and of lower tension than right. Left carotid pulse (?) smaller than right 6/3/07...	115	114
Digitally left radial pulse smaller and of lower tension than right. Left carotid pulse (?) smaller than right 6/3/07...	123	106
Digitally left radial pulse smaller and of lower tension than right. Left carotid pulse (?) smaller than right 6/3/07...	105	112
Digitally left radial pulse smaller and of lower tension than right. Left carotid pulse (?) smaller than right 8/3/07...	121	102
Digitally left radial pulse smaller and of lower tension than right. Left carotid pulse (?) smaller than right 8/3/07...	112	100
Digitally left radial pulse smaller and of lower tension than right. Left carotid pulse (?) smaller than right 8/3/07...	111	99
Digitally left radial pulse smaller and of lower tension than right. Left carotid pulse (?) smaller than right 8/3/07...	122	110
Digitally right radial pulse larger and of higher tension than left. Carotid pulses equal 18/3/07...	109	102
Digitally right radial pulse larger and of higher tension than left. Carotid pulses equal 18/3/07...	110	100
Digitally right radial pulse larger and of higher tension than left. Carotid pulses equal 19/3/07...	111	101
Digitally right radial pulse larger and of higher tension than left. Carotid pulses equal 19/3/07...	113	98
Digitally right radial pulse larger and of higher tension than left. Carotid pulses equal 20/3/07...	112	90
Digitally right radial pulse larger and of higher tension than left. Carotid pulses equal 20/3/07...	111	98
Digitally right radial pulse larger and of higher tension than left. Carotid pulses equal 20/3/07...	112	98
Digitally right radial pulse larger and of higher tension than left. Carotid pulses equal 20/3/07...	105	97
Digitally right radial pulse larger and of higher tension than left. Carotid pulses equal 20/3/07...	106	109
Digitally right radial pulse larger and of higher tension than left. Carotid pulses equal 20/3/07...	101	109
Digitally right radial pulse larger and of higher tension than left. Carotid pulses equal 20/3/07...	106	103
Digitally right radial pulse larger and of higher tension than left. Carotid pulses equal 20/3/07...	99	102
Digitally right radial pulse larger and of higher tension than left. Carotid pulses equal 20/3/07...	102	93
No. 18.—A male, aged 51 years. Aneurysm of arch of aorta.		
Digitally right radial and carotid pulses of higher tension than corresponding ones on left side 18/4/07...	145	138
Digitally right radial and carotid pulses of higher tension than corresponding ones on left side 18/4/07...	142	135
Digitally right radial and carotid pulses of higher tension than corresponding ones on left side 18/4/07...	141	133
Digitally right radial and carotid pulses of higher tension than corresponding ones on left side 25/4/07...	132	129
Digitally right radial and carotid pulses of higher tension than corresponding ones on left side 25/4/07...	132	126
Digitally radial and carotid pulses on the two sides of equal tension 26/4/07...	125	113
Digitally radial and carotid pulses on the two sides of equal tension 26/4/07...	115	105
Digitally radial and carotid pulses on the two sides of equal tension 3/5/07...	125	121
Digitally radial and carotid pulses on the two sides of equal tension 3/5/07...	123	115
Digitally radial and carotid pulses on the two sides of equal tension 3/5/07...	122	115

TABLE I.—RESULTS FOR WHICH STANTON'S INSTRUMENT WAS EMPLOYED.
Series I. (Continued).—Cases of Aneurysm.

No. of case.		St. R.	L.
		max.	max.
		Mm.	Mm.
No. 19.—A female, aged 51 years. Aneurysm of arch of aorta.			
		195	185
		195	186
	Digitally radial and carotid pulses on the	192	186
	two sides equal	192	188
		196	178
No. 20.—A male, aged 39 years. Aneurysm of arch of aorta.			
		125	126
	Digitally radial and carotid pulses on the	123	126
	two sides equal	128	132

* The readings taken of the minimum or diastolic pressure by Stanton's method have for the sake of brevity been omitted from this paper, as have also observations with Oliver's instrument which were made in some cases in order to institute a comparison between this instrument and that of Stanton.
† The same patient as No. 11 in the series in which Oliver's instrument was employed.

between the two sides of at least five millimetres, and but three of the 21 showed a difference of pressure between the two sides of at least 10 millimetres. Lastly, the fourth series in which none of these pathological conditions were present showed, in a majority of observations, in only two of the 10 cases a difference of pressure of at least five millimetres and in none a difference of pressure of at least 10 millimetres. A difference of pressure between the two sides of at least 20 millimetres only occurred on one or more occasions in two of the 20 cases of aneurysm (viz., Nos. 9 and 17), also in three of the 12 cases of dilated aorta (viz., Nos. 1, 7, and 8), and twice in the series of arterio-sclerosis and mediastinal growth (viz., Nos. 14 and 21), whilst a difference of pressure greater than 30 millimetres occurred in only one of the cases of aneurysm (viz., No. 9), in whom the greatest difference noted was

Series II.—Cases of Dilated Aorta.

No. of case.		St. R.	L.
		max.	max.
		Mm.	Mm.
No. 1.—A male, aged 47 years... ..			
	14/2/06...	149	152
	28/2/06...	135	145
	8/3/06 {	137	135
	23/3/06..	129	132
	6/4/06 {	155	137
No. 2.—A male, aged 47 years. Chronic tubular nephritis			
	11/4/06...	144	124
		124	129
No. 3.—A female, aged 46 years			
	20/6/06...	190	200
No. 4.—A male, aged 49 years			
	25/6/07...	258	260
No. 5.—A male, aged 41 years			
	13/2/06...	140	127
No. 6.—A male, aged 49 years			
	16/3/06 {	167	172
		156	150
		149	154
	28/2/06...	138	129
	9/3/06 {	145	123
No. 7.—A female, aged 52 years			
		137	132
	16/3/06 {	126	123
		131	128
No. 8.—A female, aged 43 years			
	14/2/07...	137	126
	22/3/06...	219	234
	3/5/06...	184	214
No. 9.—A male, aged 51 years			
	14/2/07...	209	210
	26/4/06...	231	205
		232	230
No. 10.—A male, aged 62 years			
	25/10/06 {	219	226
		211	192
	7/3/07 {	200	192
No. 11.—A female, aged 57 years... ..			
		205	194
		132	121
	2/11/06 {	125	128
No. 12.—A male, aged 47 years			
	16/11/06 {	142	135
		132	134
		272	272
No. 13.—A male, aged 57 years... ..			
	15/11/06...	156	152
		161	149
	8/3/07 {	159	151

75 millimetres) and on no occasion in any case of the other three series.

Comparison of digital and instrumental observations.—In comparing the digital observations on the radial and carotid pulses on the two sides with the corresponding blood-pressure determinations I have excluded those cases of aneurysm in which digital comparisons of the two radial pulses at different times gave varying results, as such observations may perhaps not be trustworthy. This leaves us with the following 11 cases of aneurysm (viz., Nos. 4, 5, 6, 7, 9, 11, 12, 15, 16, 17, and 20) as the material for comparison, in any one of which be it noted digital comparison of the two radial pulses at different times always agreed. I have disregarded differences of pressure between the two

Series III.—Cases of Arterio-sclerosis and Mediastinal Tumour.

No. of case.		St. R.	L.
		max.	max.
		Mm.	Mm.
No. 1.—A male, aged 63 years. Arterio-sclerosis			
	31/1/06 ...	112	128
	7/2/06 ...	138	137
No. 2.—A male, aged 42 years. Pulmonary tuberculosis, arterio-sclerosis... ..			
	1/2/06 ...	119	117
	3/2/06 ...	113	100
No. 3.—A male, aged 35 years. Aneurysm of descending thoracic aorta, arterio-sclerosis ...			
	20/6/06...	124	127
No. 4.—A male, aged 65 years. Chronic interstitial nephritis, arterio-sclerosis (diagnosis confirmed by necropsy)			
	8/2/06 ...	163	170
No. 5.—A male, aged 26 years. ? Syphilitic glands pressing on left bronchus			
	13/2/06 {	111	102
		107	112
	9/3/06 {	97	102
No. 6.—A male, aged 55 years. Arterio-sclerosis			
	14/2/06 {	122	125
		122	122
	20/2/06 {	109	111
No. 7.—A male, aged 64 years. Arterio-sclerosis			
	5/3/06 {	173	178
No. 8.—A male, aged 61 years. Arterio-sclerosis			
		165	174
	9/3/06 {	127	120
		126	116
No. 9.—A male, aged 66 years. Aortic stenosis and incompetence, arterio-sclerosis			
	15/3/06 {	129	122
		129	129
	22/3/06 {	183	185
No. 10.—A male, aged 62 years. Carcinoma of oesophagus (diagnosis confirmed by necropsy)			
	8/5/06 ...	203	198
No. 11.—A female, aged 53 years. Gummatous fibrosis of myocardium. Chronic interstitial nephritis, arterio-sclerosis (diagnosis confirmed by necropsy) 5/6/06...			
		125	115
No. 12.—A male, aged 60 years. Pulmonary tuberculosis, arterio-sclerosis			
	5/6/06 {	213	213
		203	184
	6/4/06 {	194	184
No. 13.—A male, aged 56 years. Mediastinal new growth... ..			
	3/5/06 {	199	183
		178	170
	22/2/07 ...	194	185
No. 14.—A male, aged 47 years. Chronic interstitial nephritis, arterio-sclerosis			
	24/5/07 ...	115	120
No. 15.—A male, aged 29 years. Chronic tubular nephritis, arterio-sclerosis			
	16/10/06...	215	243
No. 16.—A male, aged 48 years. Chronic interstitial nephritis, arterio-sclerosis			
	16/10/06 {	150	145
		157	145
	22/10/06 {	193	191
No. 17.—A male, aged 65 years. Diabetes mellitus, arterio-sclerosis... ..			
		199	195
	23/10/06 {	152	155
		155	149
No. 18.—A male, aged 72 years. Hemiplegia, arterio-sclerosis			
	25/10/06 {	175	173
No. 19.—A male, aged 43 years. Arterio-sclerosis			
	30/11/06 {	174	174
No. 20.—A male, aged 53 years. Chronic interstitial nephritis, arterio-sclerosis			
		92	85
		92	90
	26/1/07 {	209	216
		210	217
No. 21.—A male, aged 38 years. Arterio-sclerosis (diagnosis confirmed by necropsy)			
	24/2/06 ...	270	290
	8/3/06 ...	269	268
	15/3/06 ...	255	254
	21/3/06 {	274	277
		270	274

sides of less than five millimetres. In five of these cases (viz., Nos. 9, 15, 16, 17, and 20), the digital comparisons of the radial and carotid pulses on the two sides agreed fairly well with the corresponding blood-pressure determinations. In five of the remaining six cases, however (viz., Nos. 4, 5, 7, 11, and 12), digital comparisons of both radial and carotid pulses on the two sides invariably yielded results at variance with those obtained by blood pressure measurement. In four of these the digital results indicated no difference when blood-pressure measurement showed that there was one, whilst the fifth case (No. 12) yielded a difference between the pulses as examined digitally when the instrument showed

Series IV.—Pathological conditions other than those included in the first three series.—So few of these cases showed a distinct difference of pressure between the two sides that I have not here given the results.

TABLE II.—RESULTS FOR WHICH OLIVER'S INSTRUMENT WAS EMPLOYED.

No. of case.		O.R.	L.
		Mm.	Mm.
No. 1.—A male, aged 57 years. Aneurysm of descending thoracic aorta involving the arch 19/5/04...		98	75
No. 2.—A male, aged 45 years. Aneurysm of descending thoracic aorta involving also the arch	22/3/04 ...	95	70
	30/3/04 ...	85	70
	13/5/05 ...	122	83
No. 3.—A female, aged 60 years. Aneurysm of arch of aorta	22/3/04 ...	105	120
	30/3/04 ...	85	85
No. 4.—A male, aged 44 years. Aneurysm of arch of aorta	29/4/04 ...	93	78
	16/6/04 ...	73	58
No. 5.—A male, aged 40 years. Aneurysm of arch of aorta... ..	14/6/04 ...	95	85
	30/8/04 ...	67	83
No. 6.—A male, aged 44 years. Aneurysm of arch of aorta	12/8/04 ...	80	100
No. 7.—A male, aged 50 years. ? Aneurysm of arch of aorta	11/10/04...	90	105
No. 8.—A female, aged 43 years. ? Aneurysm of arch of aorta	1/2/05 ...	107	107
No. 9.—A male, aged 32 years. Aneurysm of arch of aorta	16/5/05...	110	125
No. 10.—A male, aged 48 years. Aneurysm of arch of aorta	85	85

No. 11.—A male,* aged 45 years. Aneurysm of arch of aorta	11/5/05 ...	107	120
	24/5/05 ...	124	100
	5/7/05 ...	83	93

* The same patient as No. 1 in Table I., Series I.
Series II.—Cases of Arterio-sclerosis and of Mediastinal Tumour.

No. of case.		O.R.	L.
		Mm.	Mm.
No. 1.—A male, aged 53 years. Arterio-sclerosis 13/4/04...		100	100
No. 2.—A male, aged 47 years, malignant stricture of oesophagus (diagnosis confirmed by necropsy). 3/6/04...		75	75
No. 3.—A male, aged 63 years. Mediastinal new growth (diagnosis confirmed by necropsy) 30/11/04...		78	77
No. 4.—A female, aged 64 years. Dilatation of arch of aorta 9/12/04...		114	114
No. 5.—A male, aged 58 years. Arterio-sclerosis 16/12/04 ..		134	132
No. 6.—A male, aged 62 years. Arterio-sclerosis, aortic valvular disease 23/2/05...		75	93
No. 7.—A male, aged 72 years. Arterio-sclerosis 7/3/05...		57	57
No. 8.—A male, aged 67 years. Arterio-sclerosis 9/3/05...		70	70
No. 9.—A male, aged 45 years. Mediastinal new growth 15/3/05...		93	92
No. 10.—A male, aged 69 years. Arterio-sclerosis 27/5/05...		113	113

that none existed. In the remaining case (No. 6), in two observations digital comparison of the two radial pulses gave results agreeing with those obtained by the instrument; in one observation a difference was found digitally when the instrument showed that none existed, and in one observation a difference was found digitally but in the opposite direction to that shown by the instrument. Thus in more than half the cases digital examination of the radial pulses (although checked by the carotid pulses) yielded results which were either simply useless or else actually misleading.

Comparison of blood pressure in cases of aneurysm with that in cases of dilated aorta.—The average systolic pressure (average age 47 years), calculated from all the cases of aneurysm, was 134 millimetres and the average diastolic pressure was 100 millimetres. On the other hand, the average systolic pressure calculated from all the cases of dilated aorta (average age 49 years) was 185 millimetres and the diastolic pressure was 123 millimetres.⁷ Thus the average systolic pressure in the cases of aneurysm is normal or slightly above normal, but in the cases of dilatation of the aorta is considerably raised. These facts point to the conclusion that mere height of blood pressure is a more important cause of dilatation of the aorta than of actual aneurysm, and that in the causation of the latter it is necessary to invoke some additional factor.

Observations in which Oliver's instrument was employed.—A marked difference of pressure between the two sides was shown in nine of the 11 cases of aneurysm (No. 11 was the same patient as No. 1 in the Stanton series), but only in one of the ten instances of conditions other than aneurysm (cases of mediastinal tumour, dilatation of the aorta, or of arterio-sclerosis).

Results.—These are recorded in millimetres of mercury and the following abbreviations are used: St. = Stanton's blood-pressure instrument; O. = Oliver's hæmo-dynamometer; max. = maximum or systolic pressure; R. = arterial blood pressure in right brachial artery (with Stanton's instrument) or radial artery (with Oliver's instrument); and L. = arterial blood pressure in the left brachial artery (with Stanton's instrument) or radial artery (with Oliver's instrument).

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A CONTRIBUTION TO BACTERIOLOGICAL ANALYSIS OF MATERIALS POLLUTED WITH THE BACILLUS TYPHOSUS.

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THE value of Löffler's discovery¹—viz., that malachite green added to nutrient gelatin or agar in high dilutions, while capable of inhibiting the growth of bacillus coli, does not interfere with the growth of bacillus typhosus—has since been tested and confirmed by several observers (Kiralfi, Doeberl, and others). That in analysing materials presumably polluted with typhoid dejecta the use of such a medium, representing a considerable step in advance of the Drigalski medium, would be of great value, must be obvious. Like all intestinal dejecta, so also those of typhoid fever contain in predominating numbers the bacillus coli and therefore the suppression or retardation of the growth of the latter which all media hitherto in use are incapable of effecting but which Löffler's malachite green is capable of doing, is a most important desideratum in discovering in materials polluted with such dejecta the presence of the bacillus typhosus. Unfortunately, however, the malachite-green gelatin or agar plates could detect only those individuals of bacillus typhosus which are actually present in the

⁷ Inasmuch as a large proportion of the readings from which these numbers were calculated were taken from patients who were under treatment in hospital it is probable that the results err on the side of being too low.

¹ Deutsche Medicinische Wochenschrift, No. 8, 1906.