Coital blood pressure in hypertensives *Cephalgia, syncope, and the effects of beta-blockade*

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SUMMARY During the continuous monitoring of intra-arterial blood pressure in ambulant hypertensive subjects, 18 episodes of coitus were recorded in 11 subjects. Peak values of up to 300/175 mmHg were found, the mean for men being 237/138 mmHg and for women 216/127 mmHg. Two patients with coital symptoms (cephalgia and syncope) showed no unusual responses and, when restudied after beta-blockade, one subject showed no reduction in peak coital blood pressure. The results complement those found previously in normal subjects and demonstrate the potential of the technique in investigating coital symptoms.

Sexual intercourse is occasionally associated with worrying symptoms or serious and even fatal complications. Attempts to define physiological changes therefore seem highly desirable, and have indeed been made by Masters and Johnson¹ among others. The recording of physiological variables during coitus under laboratory conditions, however, creates an unnatural setting which may produce distorted results.

In the investigation of patients with hypertension, we have performed a large number of ambulatory recordings of intra-arterial pressure. Subjects were encouraged to behave as normally as possible, being little encumbered by the monitoring apparatus, and several had sexual intercourse during the recording period. We report here the heart rate and blood pressure changes during coitus in these subjects and also in two subjects monitored specifically to investigate symptoms related to coitus. Results from a subject who had coitus during an initial study and also during a restudy after treatment with a beta-adrenoceptor blocking agent are also reported.

Methods

Subjects with suspected or established hypertension who had been referred to the hypertension clinic at the hospital were asked to volunteer for a period of ambulatory intra-arterial blood pressure monitoring. They were asked to behave normally but encouragement to have coitus was not specifically given except to two subjects who complained of symptoms related to coitus. The experimental procedure for these

studies was approved by the Hospital Ethical Committee.

The monitoring equipment consisted of a revised version² of a system initially developed in Oxford.³ A cannula was inserted percutaneously under local anaesthesia into the non-dominant brachial artery of the subject and joined by fine-bore tubing to a transducer/perfusion device. Signals from this and from adhesive chest electrocardiographic electrodes were recorded on two channels of cassette tape using a miniature recorder ("Medilog", Oxford Medical Systems). Enough wire was provided to allow the subject to position the recorder either behind him or at his side when lying flat. No event-marking system was used during these recordings but the time of occurrence of intercourse was recorded in the subject's diary. The system was calibrated each morning and evening during the recording.

In accordance with our standard procedure all tapes were written out in full using a pen-recorder (Lectromed). Episodes of sexual activity were easily identified and later replayed at faster paper speed using a fiberoptic recorder (Medelec Ltd). The nearest calibration signals were written out using the same system on an identical setting. The mean blood pressure and heart rate during the one minute before fluctuations associated with sexual activity were taken as pre-coital recordings and the highest levels sustained for five or more beats as "peak coital" values.

Results

Technically satisfactory recordings of coital blood

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pressure were made on 18 occasions involving 11 hypertensive subjects, representing 1.5% of all studies performed during this period. The mean age of the subjects was 42 years (range 29–56 years). The group included three women. The details of the patients and their recorded heart rates and blood pressures are shown in Tables 1 and 2.

The recordings showed that both heart rate and blood pressure fluctuated widely during sexual activity occasionally reaching very high levels. Though patterns varied greatly the highest peak of heart rate and blood pressure (presumably associated with orgasm) were generally simultaneous and were followed by a rapid fall to precoital levels or below. Examples of recordings can be seen in Fig. 1 (men) and Fig. 2 (women). All men achieved orgasm but only one of the women was known to have done so (case 10). Case 5 did not achieve orgasm and details for case 1 were insufficient.

Peak blood pressures were very high, the mean being 237/133 mmHg (range 184 to 300/92 to 175 mmHg) for men and 216/127 mmHg (range 190 to 260/110 to 155 mmHg) for women (Table 1 and 2). These levels were sustained in each case for only a few seconds. Peak heart rates were 131 beats/minute and 96 beats/minute for men and women, respectively.

Case reports

CASE 2

A 42-year-old Australian was referred because of "blinding" global headaches lasting between 10 minutes and one hour, precipitated only by sexual intercourse with extramarital partners. Examination was normal except that his blood pressure was moderately raised (165/115 mmHg). Routine investigations including urinary catecholamine excretion were normal.

An ambulatory blood pressure recording lasting 36 hours was undertaken during which he achieved orgasm five times. As can be seen from Table 1, the highest pressure experience (243/151 mmHg) was during intercourse with his wife. No headaches occurred during the recording and maximum pressures were within the range shown by asymptomatic hypertensives. Antihypertensive medication was prescribed (propranolol 80 mg bid and cyclopentiazide 0.25 mg daily) and despite no loss of sexual function, headaches did not recur. He remains well, normotensive, and free from headaches, three years after the study.

CASE 5

This housewife of 39 years was referred for investigation of syncopal attacks. Borderline hypertension was noted (130 to 150/95 to 110 mmHg) and screening

investigations including electrocardiogram and electroencephalogram were all normal. Attacks of dizziness increased in frequency, some coming on without warning and leading to unconsciousness and generally lasted for about three minutes. Her husband reported no signs of epileptic convulsions and empirical treatment with propranolol, digoxin, procainamide, or phenytoin did not affect the attacks, the only consistent trigger of which was sexual intercourse.

Outpatient electrocardiographic monitoring spanned a typical attack but no arrhythmia was detected. A period of 48 hours of ambulatory blood pressure monitoring was carried out during which a typical attack with loss of consciousness followed sexual intercourse (no orgasm); the record is shown in Fig. 2b. No arrhythmia or period of sustained or pronounced hypotension was apparent.

The patient was strongly reassured and treatment (cyclopentiazide 0.5 mg daily) given for the hypertension. Over the subsequent two years the attacks decreased in frequency and their description seems to indicate a non-organic nature.

CASE 7

This 29-year-old agricultural research worker had sexual intercourse twice during a routine ambulatory blood pressure assessment after borderline clinic readings. He was later treated for hypertension (sotalol 80 mg tid) and on a subsequent recording he had sexual intercourse again. All three episodes occurred in the early afternoon and the subject felt them to be comparable. Peak coital values of heart rate and blood pressure achieved during the restudy were between those found during the two pretreatment episodes, despite both clinic and mean ambulatory measurements indicating satisfactory blood pressure reduction (see Table 1).

Discussion

Sexual intercourse probably affects the cardiovascular system by a number of component methods. There are certainly elements of both isometric and dynamic exercise, breath-holding episodes, and psychological stress, all of which are known to increase heart rate and blood pressure. In addition there is the general activity of autonomic reflexes necessarily involved in arousal, erection, orgasm, and ejaculation. That sexual arousal, as opposed to other strong emotions, produced consistent rises in heart rate and blood pressure in young men was shown by Scott in 1930.⁴ Later workers^{1 5 6} have shown the extreme magnitude of these changes in some subjects when monitoring covered the period of orgasm. All these studies, however, were carried out under laboratory conditions and subject to the potential sources of bias

Fig. 1 Examples of coital blood pressure recordings in three hypertensive men: (a) case 2; (b) case 6; (c) case 8. Note the widely fluctuating pattern and simultaneous peaks in heart rate and blood pressure at the time of presumed orgasm.

mentioned earlier. When Hellerstein and Friedman⁷ monitored the ambulant electrocardiograms of middle-aged patients with ischaemic heart disease they found that the peak coital heart rates were much lower than those expected from laboratory results.

The rapid changes in heart rate and blood pressure also indicate the need for a measuring system using continuous monitoring; the value of intermittent non-invasive measurements is clearly questionable. Littler

et al.,⁸ using monitoring equipment similar to ours, reported heart rate and blood pressure in six men and one woman (all normotensive), and showed that intra-arterial pressures of up to 233/128 mmHg were achieved during coitus. From our study it is apparent that those subjects starting with higher baseline levels reached correspondingly higher peak pressures during coitus.

It is possible that pathological cardiovascular events

Fig. 2 Examples of coital blood pressure recordings in three hypertensive women: (a) case 1 (orgasm not recorded); (b) case 5 (no orgasm, coital syncope); (c) case 10 (orgasm).

occur directly as a result of high peak pressures in hypertension (or ischaemic heart disease) and, if so, the implications for management, both in terms of behaviour modification and antihypertensive medication, are profound. Such events known to be associated with sexual activity include angina pectoris, myocardial infarction, sudden cardiac death, cerebral haemorrhage, and other neurological symptoms. Though anecdotal evidence for the occurrence of the

more serious complications is common, epidemiological surveys⁹⁻¹¹ suggest that this is not the case. Recurrent and worrying symptoms are also uncommon but may, as exemplified by cases 2 and 5, present problems of diagnosis.

Coital cephalgia, noted by Hippocrates¹² and documented more fully in recent years, may occasionally be a manifestation of subarachnoid haemorrhage^{13 14} but more usually appears to follow a benign

Table 1 Details of patients and coital blood pressure levels in eight hypertensive men. Comparative mean values from the study by Littler *et al.*⁸ have been included

Case No.	Age	Diagnosis	Episodes of sexual intercourse	Clinic BP (mmHg)	Precoital levels		Peak coital levels	
					Heart rate (b/min)	BP (mmHg)	Heart rate (b/min)	BP (mmHg)
2	42	Essential hypertension and coital cephalgia	1 (mistress)	165/115	80	150/90	120	218/120
			2 (wife)		68	135/86	123	243/151
			3 (mistress)		90	167/84	114	222/119
			4 (mistress)		65	128/67	125	233/133
			5 (mistress)		65	122/62	110	200/92
3	49	Hypertension with LVH	1	204/123	76	200/108	115	300/175
4	47	Essential hypertension	1	155/108	84	147/96	120	208/138
6	43	Essential hypertension	1	150/100	94	145/80	170	260/150
7	29	Essential hypertension <i>Treated hypertension</i>	1	153/98	100	141/82	106	184/112
			2		80	150/97	110	213/136
			3		105	125/68	120	206/120
8	31	Essential hypertension	1	159/95	88	120/64	120	220/136
9	56	Essential hypertension	1	180/108	85	195/108	114	235/140
11	54	Essential hypertension	1	190/110	115	208/120	145	294/170
			2		100	162/82	142	286/160
Mean values 44			14 total	170/107	85	155/87	124	237/138
Littler <i>et al.</i> ⁸	Mean 28	Normal subjects	6 total	128/78	78	120/80	131	185-115
n = 6								
Range	20-35			110-138/ 60-90	73-94	98-128/ 52-91	100-160	153-133/ 91-135

LVH, left ventricular hypertrophy.

Table 2 Details of patients and coital blood pressure levels in three hypertensive women. Comparative values from the one case reported by Littler *et al.*⁸ have been included

Case No.	Age	Diagnosis	Episodes of sexual intercourse	Clinic BP (mmHg)	Precoital levels		Peak coital levels	
					Heart rate (b/min)	BP (mmHg)	Heart rate (b/min)	BP (mmHg)
1	41	Essential hypertension	1 ? orgasm	160/105	74	142/62	132	198/116
5	36	Essential hypertension, coital syncope	1 No orgasm	140/102	100	130/72	125	190/110
10	35	Essential hypertension	1 Orgasm	173/102	95	160/95	160	260/155
Mean			3 Total	158/103	90	144/76	139	216/127
Littler <i>et al.</i> ⁸	37	Normal subject	1 No orgasm	130/ 85	66	98/52	96	120/75

course.¹⁵⁻¹⁷ Though symptoms may be severe, such that invasive investigations have been performed, diagnoses of the underlying mechanism have remained speculative and treatment empirical. Lance¹⁷ in his series describes raised resting blood pressure in seven of his 21 patients, in common with case 2.

Coital syncope was described in several of the patients reported by Kriz,¹³ and tentative explanations have included hyperventilation, cardiac arrhythmia, hypotension, and cerebrovascular insufficiency caused by cervical spondylosis. In our patient the

symptoms were clearly not those of *le petit mort*, occasionally described in association with profound orgasm, as some episodes were not associated with sexual activity. The normal results of investigations, lack of objective observers, and subsequent description of attacks, however, have led us to entertain a functional rather than organic diagnosis. In spite of the negative results in both these patients, ambulatory blood pressure monitoring did help to exclude some diagnoses and we feel its use should be considered in other similar cases.

The treatment of symptoms (and the prophylaxis

against pathological events) associated with coitus could comprise any of a range of measures from complete abstinence to behaviour modification¹⁸ and drug treatment. Jackson¹⁹ reported that appropriate management in timing and conditions of coitus together with appropriate drug treatment could reduce considerably the incidence of anginal attacks, while Fox²⁰ showed that in one pair of (normotensive) subjects, propranolol reduced peak coital systolic pressure. Again in this respect (case 7), variability in response possibly defeated any attempt to show a definite trend (or lack of it) after beta-blockade. It may be that if isometric exercise is a prominent component of coitus the antihypertensive effect of beta-blockers and many other drugs may be limited,²¹ though recent work in rabbits has shown reduction of peak coital heart rate, blood pressure, and plasma noradrenaline concentration after propranolol.²²

The acquisition of further comparable information is clearly desirable, though the ethical objections to collecting data with invasive techniques are considerable and the reliability of non-invasive techniques of measuring blood pressure, especially during physical activity, is questionable. The elucidation of some recurrent symptomatic problems or evidence of their benign nature, however, may usefully be gained by this method.

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