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SEXUALITY AFTER STROKE WITH HEMIPLEGIA. I

I. *Aspects of Sexual Function*

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ABSTRACT. In a consecutive series of 51 one-stroke hemiplegics some aspects of sexuality were investigated using structured interviews. Findings were related to treatment with anti-hypertensive drugs. In most subjects the site of brain lesion was visualized by X-ray methods. Moreover, in a sub-sample of 15 consecutive males LH, FSH and prolactin were assessed using standard clinical radioimmunoassay techniques. Serum testosterone including response to HCG-stimulation was also measured. Both in males and females frequency of intercourse and durations of foreplay and of intercourse were markedly reduced. For the males erectile problems were rare before but occurred for the majority after stroke. For the females, but not for the males, orgastic dysfunction was relatively common pre-stroke. After the stroke such dysfunction occurred for 75% of the females and 64% of the males. Partnership sexual drive also decreased. Each of the 15 males hormonally screened had values within the predicted normal and responses to HCG-stimulation were also adequate. Moreover, actual levels of hormones were associated neither with change in sexual function nor with the sexual function per se at the time of the investigation. Thus, in this sample hormonal disarrangement did not appear to be the cause of sexual dysfunction. Surprisingly, no association between erectile dysfunction and use of anti-hypertensive drugs occurred. We believe that sexual dysfunctions in hemiplegics may rather be explained in terms of coping than by endocrine deficits or by anti-hypertensive treatment.

Key words: Sexuality, stroke, hemiplegia, hypertension, hormones

In a previous investigation (41) we found that in epidemiologically defined different samples of hemiplegics, 72% experienced abrupt and permanent cessation or decrease in frequency of coitus. This is in general agreement with the only other comparable reports we have been able to locate (14, 20, 24, 28). We reported that level of post-stroke frequency of intercourse was closely correlated to level of partner dependence in simple everyday chores (ADL) and to a lesser extent to degree of motor impairment and exteroceptive defects. That investigation did not however, explore other aspects of sexuality and their possible association with disturbances of brain or hormone regulatory mechanisms all with the possible influence of anti-hypertensive medication (cf. 19).

The present investigation was, therefore, designed to study in greater detail changes in several parameters of sexual behaviour and to probe whether the pituitary-gonadal axis malfunctions in male hemiplegics. Furthermore, effects of anti-hypertensive medication on erection of male hemiplegics were analysed.

MATERIALS AND METHODS

Subjects. Thirty-nine males (mean age 54±9 years) and twelve females (mean age 50±12 years) with hemiplegia/hemiparesis after one single stroke (47) were included in the present study. Out of a consecutive series of 117 post-stroke hemiplegics admitted to the Department of Physical Medicine and Rehabilitation, the 51 were selected by application of criteria presented in Fig. 1. All had been discharged from hospital and had been at home for at least two months prior to the investigation. Mean time interval between the stroke and investigation was 14 months (range 3–68). All subjects underwent careful neurological examination and 22 of them had signs of right and 29 subjects of left hemispheric damage. The type and localization (Table I) of brain damage was investigated by computerized brain tomography in 39 subjects (29 males, 10 females). Angiography was performed in 27 subjects (20 males, 7 females). In six males and one female no X-ray examination was carried out. Among the intra-hemispheric lesions two were extensive due to occlusion of the middle cerebral artery. Sixteen were neocortically situated, 18 were localized within central structures only (putamen, internal capsule, thalamus). Moreover, two were brain-stem lesions. Anti-hypertensive medicine was being used by 18 males and 4 females. Out of the 18 antihypertensively treated males 5 used beta-blockers only, 6 other antihypertensives including diuretics and 7 combinations of a beta-blocker with other antihypertensives. None of the 51 subjects were undergoing treatment for depression.

Sexual parameters. Subjects volunteered to answer questions concerning frequency and duration of inter-

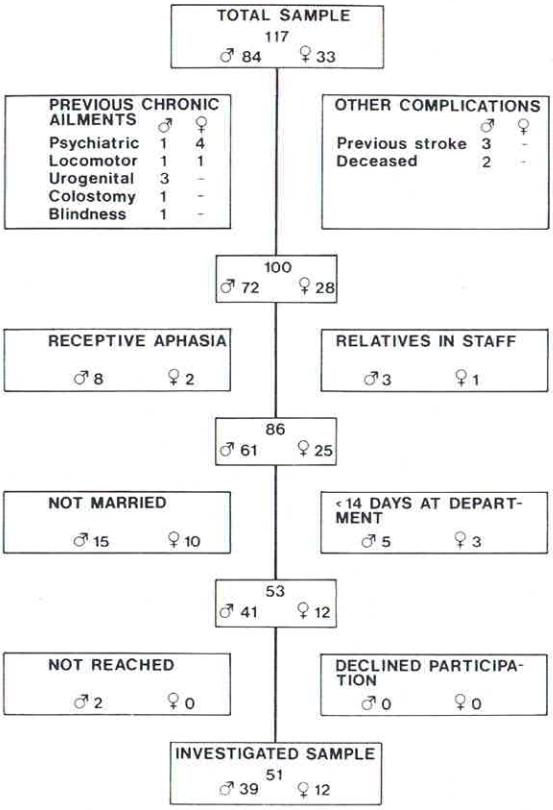

Fig. 1. Total consecutive sample of stroke victims and criteria for participation.

course, erectile and orgastic function and sexual partnership-drive before and after the stroke (cf. Table III). Thus, changes in certain coital parameters following stroke could be assessed. Each interview was conducted under undisturbed conditions.

Hormones. In a sub-sample of 15 consecutive males, serum levels of follicle stimulating hormone (FSH), luteinizing hormone (LH) and of prolactin were determined using standard clinical radio-immunoassay techniques (cf. 8, 21, 31, 34). Serum testosterone concentration was measured using a method described by Damber & Janson (5). These values were compared with the normal hormonal concentrations given for each method. The testicular response to gonadotropic stimulation was determined three days after each of two successive intramuscular injections of human chorionic gonadotropin (HCG) (Gonadex®, AB Leo, Sweden). All blood samples were taken at 8.00–8.30 a.m. Five middle-aged males (mean age 40±4), who felt that they had a normal sex life, served as comparison in the investigation of effect of HCG administration on testosterone serum levels.

Statistics. To evaluate associations between pairs of non-parametric variables the χ^2-test and the Fisher Exact Probability Test were used when appropriate (40). All statistical tests were performed at the 5% significance level ($p \leq 0.05$). Results in the text and tables concerning parametrical data are expressed as means ± standard errors.

RESULTS

It was evident from the present study that marked changes occurred in the coital situation following stroke. 31% of males and 27% of females had ceased commonly termed foreplay, whilst 15% males and 18% females had decreased duration of foreplay (Fig. 2). Decreased frequency of intercourse appeared to be more common in males than in females (Fig. 2). Thus, whereas 41% of males had ceased and 31% had decreased frequency only 17% of females had ceased and 42% had decreased frequency. Five males continued caressing (i.e. foreplay) after the stroke but discontinued following this up by penetration. In contrast, one female had ceased having foreplay and, in bed, only engaged in penetration. The duration of the whole sex-play (Fig. 2) was decreased for the majority of males and for nearly half of the females. However, seven of the males had increased durations of foreplay and/or total sex-play.

Prior to the stroke, 21% of the males often or occasionally had difficulties achieving excitatory erection (Fig. 3). After the brain damage, the majority of these subjects had either lost their erectile capacity or had frequent or occasional problems achieving erection. Increased erectile dysfunction was significantly (χ^2: 5.28/12.17) associated with increased duration of foreplay/sex-play.

In the sub-sample of 15 males each subject's level of basal serum testosterone was normal both according to the given normal values and to the five, somewhat younger, normal subjects also investigated (Fig. 4). Furthermore, both hemiplegics and

Table I. *Type of brain lesion determined by X-ray or by laboratory procedures in 39 males (♂) and 12 females (♀) with hemiplegia post-stroke*

Type of lesion	Number of patients ♂	♀	Total
Cerebral haemorrhage	9	5	14
Subarachnoidal haemorrhage	1	2	3
Infarction	19	4	23
Other	1	–	1
No findings/no investigation	9	1	10

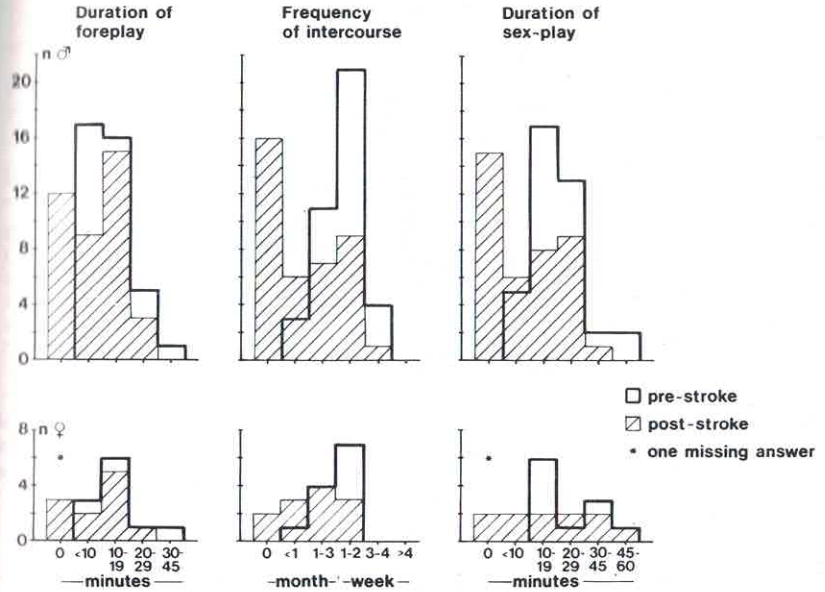

Fig. 2. Duration of foreplay, frequency of intercourse and duration of sex-play in 51 hemiplegic patients before and after stroke. 39 males (♂), upper diagrams and 12 females (♀), lower diagrams included.

normal subjects displayed similar increases in serum testosterone following gonadotropic stimulation. Moreover, mean level of sex-hormones FSH, LH and prolactin were within normal limits (Table II).

To analyse whether the actual level of basal testosterone was correlated with erectile dysfunction, the latter parameter was trichotomized (no change/decreased frequency of erection/no erection). No association between level of testosterone and level of erectile problems was found. The relative magnitude of the testicular response after gonadotropic stimulation did not, either, correlate with level of erectile function/dysfunction.

Out of the 18 males on anti-hypertensive drugs, 11 (61%) had erectile difficulties, while this was

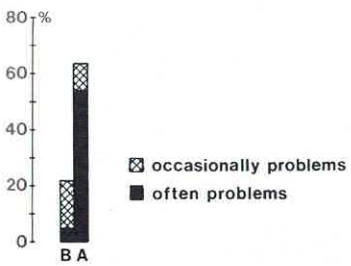

Fig. 3. Relative frequency of difficulties achieving excitatory erection in 39 males before (B) and after (A) stroke with hemiplegia.

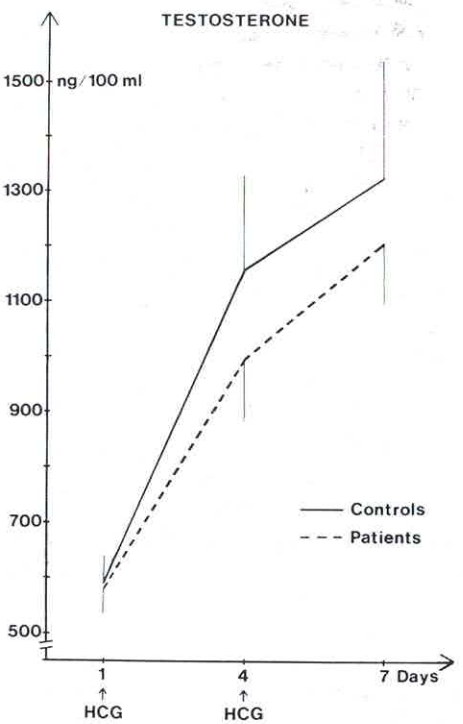

Fig. 4. Mean morning serum level of testosterone in 15 male hemiplegics post-stroke and in 5 healthy males. Basal: Before stimulation, day 1; 72 hours after stimulation with 2000 I.E. Gonadex®, day 4; 72 hours after second Gonadex® stimulations which was performed immediately after day 4 sample was obtained.

Fig. 5. Relative frequencies of orgasm in 39 males (♂) and 12 females (♀) before (B) and after (A) stroke with hemiplegia.

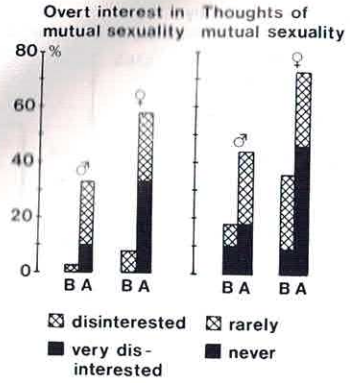

Fig. 6. Relative frequencies of overt interest in mutual sexuality, and thoughts of mutual sexuality in 39 males (♂) and 12 females (♀) before (B) and after (A) stroke with hemiplegia.

the case for 10 of the 21 subjects (48%) who were not on anti-hypertensive therapy. Moreover, only two males on beta-blocking agents had erectile problems. Thus, use of anti-hypertensive drugs did not significantly affect erection.

Whereas the vast majority of males (80%) prior to the stroke achieved orgasm regularly, only 42% of the females did so (Fig. 5). After the stroke a pronounced change had taken place for the males. Now only 36% achieved orgasm regularly. Changes were much less pronounced for the females but four of the twelve females were anorgastic. Two of these anorgastic females had ceased having intercourse. The majority (15 out of 18) anorgastic males also had ceased having intercourse post-stroke. One male subject achieved orgasm by caressing only.

Table III summarizes the frequency of changes. For nearly all the parameters deteriorations occurred for about 40–70% of the subjects. Decrease in frequency of orgasm after stroke was, however, twice as common in males as in females. Only in this respect was there a significant (χ^2: 3.62) difference between the male and female groups.

In retrospect few hemiplegics felt that prior to the stroke they showed their partner any degree of disinterest in mutual sexuality (Fig. 6). After the stroke verbal and/or non-verbal communication had diminished considerably. Prior to the stroke, the majority of both males and females often or occasionally had thoughts about having sex with their partners (Fig. 6). However, after the stroke, such thoughts rarely or never occurred for 73% of females and 43% of males. None of the subjects showed increased interest in and/or thoughts about mutual sexuality. There was a close and gender independent association (χ^2: 11.02) between thoughts of and shown interest in mutual sexual activities. Fewer thoughts of mutual sexual activities were significantly correlated with decreased/ceased frequences of intercourse (χ^2: 8.13), orgasm (χ^2: 10.78) and—for the males—erectile dysfunction (χ^2: 8.47).

The side (left vs. right) of the hemiplegia was not significantly correlated with change in any of the sexual parameters investigated. Furthermore, cross-tabulations with all sexual parameters and neo-cortical ($n=16$) vs. central/brain-stem lesions ($n=20$) revealed no significant associations. Nine of the lesions were localized within the Fronto-Limbic system (cf. 30). These were not, either, significantly associated with changes in sexual function or with actual level of sexual function. Moreover, there

Table II. *Hormonal concentrations in 15 males with hemiplegia post-stroke, in comparison with normal values*

	FSH (μl/l)	LH (μl/l)	Prolactin (μg/l)	Testosterone (mg/100 ml)
Hemiplegics (mean ± SE)	19.6±3.7	14.4±4.1	8.9±1.3	579±42.5
Normal values (range)	3–28	4–22	5–15	>400

Table III. *Questions on sexuality and their alternative answers used in structured interview; and relative frequency (%) of changes for 39 males (M) and 12 females (F) after stroke with hemiplegia*

χ^2 for male/female differences are given; with one degree of freedom $\chi^2 \geq 2.71$, $p \leq 0.05$

Item	Code	Decrease (%) M	Decrease (%) F	χ^2 M/F
Duration of foreplay	A	46	42	0.02
Duration of sex-play	A	59	42	0.64
Frequency of intercourse	B	72	58	0.77
Frequency of erectile difficulties (males)	C	59	–	–
Frequency of orgasm	C	56	25	*3.62*
Shown interest in mutual sexuality	D	41	58	1.11
Thought of mutual sexuality	C	28	50	2.65

A: No foreplay/sex-play
≤10 min
11–20 min
21–30 min
31–45 min
>45 min

B: No coitus
≤one/month
1–3 times/month
1–2 times/week
3–4 times/week

C: Often
Occasionally
Rarely
Never

D: Very interested
Interested
Disinterested
Very disinterested

was no association between hormone levels and these, gross, X-ray indicators of approximate site of brain lesion.

DISCUSSION

The principal findings of this investigation are that intercourse after stroke with hemiplegia for the majority of subjects is either discontinued or it becomes rarer and in general shorter. The finding of decreased frequency of intercourse is virtually congruent with other reports (24, 28). Moreover, in those males who have increased duration of foreplay the increase is an unwanted sequela of erectile dysfunction. Furthermore, erectile difficulties become extremely common in male hemiplegics. Decreased frequency of orgasm and anorgasmia are only partly due to cessation of intercourse. The observations on the pre-stroke female orgastic dysfunction are in agreement with other published reports on healthy female populations (7, 10, 44, 46). Moreover, sexual drive towards the partner also decreased.

Both Kalliomäki et al. (24) and Goddess et al. (16) reported that decreased libido—nihil ultimo definietur—was more common with dominant than with non-dominant vascular hemisphere lesions. This concept was not supported by the present study. The wide variations in site, and size, of brain lesions in our patients do not warrant any definite conclusions concerning the impact of the lesional site on sexual function, although *apparently* no significant associations were found. The possibilities of such associations shall, though, briefly be discussed. Fischer (9) who studied the sexual life of patients operated for brain tumors at different sites found no correlations between site of brain lesion and sexual behaviour while Hierons & Saunders (18) described a series of male patients with temporal lobe lesions who were "impotent" but had "normal libido". Several authors have found sexual dysfunction with or without decreases in libido in patients suffering from temporal lobe epilepsy (15, 17, 29, 43) and there are also findings suggesting that frontal lobotomy does not influence the pleasures of sexual activity (11, 35).

Since levels of FSH, LH, prolactin, basal testosterone and testicular testosterone responses to HCG were normal in all subjects vascular brain lesions do not appear to cause impairment of the pituitary-gonadal axis in males. Slightly decreased testosterone response to HCG-stimulation (cf. Fig. 4) were found in patients when compared to the younger normals. Male serum testosterone levels have, indeed, been found to decline slowly after the age of 50–55 years (33, 39), but this change is accompanied neither by decrease in libido nor decrease in general sexual activities (2, 6). Moreover, testicular responses to gonadotropic stimulation is reduced in males older than 55 years (33). Thus, the trends of relative testicular hypogonadism found in this study are suggested to be dependent on age and not on lesion.

Although there is evidence that androgen has a

maintaining effect on sexual function (32, 45) the relationship between psychogenic sexual dysfunction in man and sex hormones is not fully understood. Kraemer et al. (25) suggested that sexual inactivity increases testosterone. Moreover, Schwartz et al. (39) found significantly higher testosterone values with primary than with secondary erectile impotence. On the other hand, Ismail et al. (23), Legros (27), Raboch et al. (38) found significantly lower testosterone values in impotent males than in non-dysfunctioning males. However, others (4, 26, 36) observed no testosterone differences between normal and psychogenically impotent males. In fact, under favourable social conditions adequate coital activity may take place with serum testosterone as low as 3 ng/ml (37). Furthermore, Brown et al. (3) found that in young males differences in sexual activity and interests were not reflected in their testosterone level. However, castration is known to induce marked disturbances in sexual function (1). Thus, it appears that only marked changes in testicular endocrine function is accompanied with disturbances in sexual functions and such disturbances were evidently not found in this investigation.

It was surprising that in the present work, there was no significant association between erectile dysfunction and anti-hypertensive treatment since other workers have reported such findings with subjects treated for hypertension (12, 19) and in patients with hypertension and myocardial infarction (42). The anti-hypertensives appear to cause reductions of penile blood pressure and arterial flow velocity acceleration (22, 42).

In conclusion, the present investigation does not demonstrate evident organic background(s) for the common emergence of sexual dysfunctions after stroke with hemiplegia. We prefer to explain the dysfunction as mainly psychogenic. Thus, in hemiplegic patients changes in sex-roles (13) affect sex-life negatively and custodial attitudes taken by the partner (14) are associated with decrease in frequency of intercourse. Furthermore, dependency in self-care produces the same effect (41). In case of females the stroke may even serve to legitimate dissociation from a pre-stroke unrewarding sexual life which in this study was demonstrated by a high frequency of orgastic problems. In any case there is probably a non-organically determined association between erectile and orgastic dysfunction and partnership sexual-drive. In a subsequent study the partnership adjustment and experiences of sexual fulfillment will, therefore, be examined.

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