Eur J Vasc Endovasc Surg **17**, 306–312 (1999)
Article No. ejvs.1998.0770

Sexual Function in Women Suffering from Aortoiliac Occlusive Disease

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Objective: *to describe the sexual function in women suffering aortoiliac occlusive disease (AIOD) and in an age-matched reference group.*
Patients and methods: *thirty-six women suffering from AIOD were included. Twenty were investigated before vascular intervention (*untreated*) and 16 different women after treatment (*treated*). Eighteen age-matched women served as a* reference *group. The patients answered a questionnaire including sexual, social and medical questions and a gynaecological examination was performed.*
Results: *untreated patients with AIOD have a significantly impaired physical well-being compared to the other groups (*p<*0.001). A negative effect of the vascular disease and its treatment on sexual life was experienced by 69% of* treated *compared to 40% affected among* untreated *(*p=*0.05). Vulval sensibility was impaired in 44% of* treated*, 11% of* untreated *and 22% of* reference *patients. Defective anal sphincter function was found in 33% of* treated*, 17% of* untreated *and 6% in the* reference *group. Those differences were not statistically significant.*
Conclusions: *symptomatic AIOD in women is associated with a significantly impaired physical and sexual well-being. Though limited by size and methodology, the results indicate the possibility of iatrogenic nerve damage.*

Key Words: Aortoiliac occlusive arterial disease; Sexual function; Females.

Introduction

Sexual dysfunction is common among men with aortoiliac occlusive disease (AIOD); 25–39% having erectile dysfunction.[1–3] Following aortic surgery, ejaculatory disorders may be caused by iatrogenic damage to the superior hypogastric plexus and the pelvic or pudendal nerves in 21–50% of male patients.[4–6]

The same mechanisms could hypothetically affect the sexual function in women because of obvious similarities in anatomy and physiology. Increased blood flow to and distension of the cavernous tissue in the labiae, lubrication and erection of the clitoris are equivalent to the male erection. The ability to obtain orgasm can be compared to ejaculation. In both sexes, besides an adequate vascular supply to the genital organs, sexual function depends on intact parasympathetic and sympathetic nervous systems as well as sensory and motor systems, all structures that can be damaged during surgery. In addition the levator ani muscle, the bulbocavernous reflex and adequate sensibility of the vulva are of importance for the female sexual function.[7]

In spite of a high frequency of sexual problems in men with AIOD, the effect of AIOD or its treatment on female sexual function is to our knowledge unknown and never studied. Prompted by this lack of data, the purpose of this study was to investigate the quality of sexual life in women before and after treatment for AIOD.

Patients and Methods

Forty-five female patients treated for symptomatic AIOD with vascular reconstruction or percutaneous transluminal angioplasty (PTA) at the Surgical Department of the Karolinska Hospital 1992–1996 were asked to participate in the study. Out of the 45 women, nine did not wish to participate, leaving 36 to be studied. Inclusion criteria were age of less than 70 years and AIOD requiring an independent vascular surgeon to perform an intervention. All patients had preoperative angiograms revealing haemodynamically significant lesions (occlusion or stenosis

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1078–5884/99/040306+07 $12.00/0

Table 1. Patients' characteristics.

	Untreated $n=20$	Treated $n=16$	Reference $n=18$	
Mean age	56 years (38–69)	58 years (48–70)	56 years (48–69)	$p=0.292$
Myocardial infarction/treatment for angina	1	3	0	$p=0.098$
Hypertension (>160/90)	2	8	4	$p=0.046$
Diabetes (type I and II)	0	2	0	$p=0.084$
Smoking	10	15	10	$p=0.001$
Claudication	17	12	0	$p=0.675$
Critical ischaemia	3	4	0	$p=0.675$
Menopause	15	14	14	$p=0.698$
Hysterectomy	5	2	3	$p=0.681$
Partner	15	10	14	$p=0.601$
Hormone replacement therapy	5	5	10	$p=0.128$
Partus ≥ 1	18	14	17	$p=0.853$

Three-way analysis with Chi-squared exact test.

>80%) in the aorta, common iliac arteries and/or internal iliac arteries.

Twenty women were investigated during work-up before the vascular procedure (*untreated*). Sixteen different women were investigated an average of 1 year (range: 1 month–4 years) after treatment (*treated*). Of these, eight women were treated with aortobifemoral bypass (AFBG), six with PTA and two with iliofemoral bypass (IFBG).

The average duration of symptoms was 4.4 years (range: 0.75–12) in the *untreated* group and 5.3 years (range: 2–10) in the *treated* group. Eighteen healthy age-matched women were recruited from the outpatient clinic, where they had been treated for minor benign skin tumours or cholecystectomy without complications, serving as a reference group (*reference*). The characteristics and medical background of the three groups were similar except for smoking and hypertension (Table 1). An equal number of women in each group were married or had a partner at the time of investigation. The number of deliveries was also equal in the three groups.

The investigation consisted of a structured interview lasting for 45–60 min followed by a gynaecological examination performed by a gynaecologist trained in sexology. The examiner was not aware of the extent of vascular disease or the chosen vascular intervention, but, since the structured interview and examination was performed by the same gynaecologist, the examiner was not completely blinded. The interview consisted of a study-specific questionnaire (63 questions) covering medical, social and sexological aspects of life. Besides simple open questions, such as age and number of pregnancies, they were either of multiple choice type or scored on a visual analogical scale (VAS). The women's present social situation was examined, with seventeen questions covering marital status, general well-being at home and at work, as well as their financial situation. Possible negative or positive events in these areas were also investigated.

The sexological instrument used was according to McCoy[9] with addition of questions dealing with the women's medical situation.

In questions comparing present to previous situation, the *untreated* group were asked to relate to the time before onset of symptoms and the *treated* group to the time before treatment. Based on the average duration of disease in the patient groups the *reference* group were asked to base their answers on a comparison with their state five years before the interview.

The gynaecological examination was a routine examination that included four neurological tests reflecting the function of the superior hypogastric plexus, pelvic and pudendal nerves. The tests were repeated twice and all graded as adequate, impaired or absent: (1) evaluation of the sensibility of the vulvae, tested with a slight touch of a cotton-covered stick; (2) the function of the inner anal sphincter tested by anal penetration and evaluated by the examiner's perception of the contraction, at inserting or withdrawing the finger; (3) the bulbocavernous reflex reflecting the sensory and motor function was tested by a slight touch with a wooden stick, on the preputium of the clitoris and was visually graded by the examiner; (4) the voluntary motor function of the levator ani muscle was measured by asking each woman to contract her pelvic muscles twice and evaluated by anal penetration, at inserting or withdrawing the finger, after the second contraction.

Statistical analysis

The three groups were compared at two levels. Three-way Chi-squared test was used to analyse if there

Table 2. Previous and present sexual function.

	Untreated $n=20$	Treated $n=16$	Reference $n=18$	
Previous sexual function:				
Sexual relationship*	65±19	66±14	51±29	$p=0.095$
Sexual intercourse**	16	15	18	$p=0.090$
Present sexual function:				
Sexual relationship*	37±37	48±42	45±34	$p=0.770$
Sexual intercourse**	11	7	12	$p=0.406$
Quality of relation to partner*	65±36	83±14	83±8	$p=0.080$
Importance of active sexual life*	52±36	54±35	70±26	$p=0.290$
Content with extent of sexual life†	4.6±2.0	3.8±1.8	4.4±1.7	$p=0.460$
Sexual desire*	32±7	32±6	30±6	$p=0.950$

* VAS results analysed with ANOVA, F-test, presented as mean±S.D. (0=very poor, 100=excellent). Percentage in brackets.
** Number of patients analysed with three-way Chi-squared test.
† VAS results graded according to McCoy's questionnaire (1=very discontent, 7=very content).

were any differences among the three groups. Fischer's exact test was used for a pair-wise comparison. Answers given on a VAS were analysed with ANOVA. Differences were considered significant when $p<5\%$. The study was approved by the local Ethical Committee of the Karolinska Hospital.

Results

Social and sexual function

Physical well-being at the time of investigation (rated on a scale 0–100; 0=very poor, 100=excellent) was significantly impaired ($p<0.001$) in the *untreated* group (mean=36; S.D.=±20.7) as compared to the other two (*treated*; mean=67; S.D.=±19.3 vs. *reference*; mean=70; S.D.=±30.4). The psychological well-being was comparable ($p=0.214$) in the *untreated* (mean=57; S.D.=±26.4), *treated* (mean=73; S.D.=±23) and in the *reference* group (mean=66; S.D.=±33).

When the women rated their present social situation no significant difference was found between the groups (work $p=0.34$, economy $p=0.15$, family $p=0.51$). Untreated women did, however, rate significantly more positive changes in their family life than the other women ($p=0.03$), while the other factors did not differ between the groups.

The self-perceived sexual function is summarised in Table 2. The extent of the sexual activity previously and at the time of investigation was similar in the groups. The groups were also similar regarding the satisfaction and extent of their present sexual relationships, importance of sexual life and grade of desire. A trend towards a dissatisfaction with the relationship to the partner was noticed among the *untreated* group.

Significantly more ($p=0.05$) women in the *treated* group (69%) felt that their vascular disease or its treatment had affected their sexual function negatively compared to the effect of the disease in the *untreated* group (49%) (Table 3). Twenty-eight per cent of women in the *reference* group felt that minor diseases, i.e. back pain or urinary tract infection, negatively affected their sexual function. Changes in lubrication over time, complaints of poor lubrication during intercourse and orgasm ability are summarised in Table 3. A relatively large number of women found the questions regarding sexual function irrelevant in relation to their presently low sexual activity (Table 3).

Gynaecological examination

More women in the *treated* group had impaired sensibility of the vulva compared to the other groups, but the difference was not significant (7/16 vs. 2/18 and 4/18) (Table 4). The distribution of sensibility defect among the *treated* group was unilateral in 3/8 having AFBG and bilateral in 1/8 AFBG, 1/2 IFBG, 2/6 PTA. Among the *reference* group all (4/18) were bilateral, while the two defects among the *untreated* group were unilateral. One-third of *treated* patients had absent or weak anal sphincter tone. The total number of patients suffering one or more neurological deficits were similar; 6/18 in *untreated*, 9/16 in *treated* and 5/18 in the *reference* group ($p=0.2$). Four of the nine affected women in the *treated* group had two or more deficits and, of these, 3/4 had been treated with AFBG and 1/4 with IFBG. The differences between the groups were not significant, although the numbers are small. Among women treated with PTA only, there was one with an isolated impaired anal sphincter function, besides the two with disturbed vulval sensibility mentioned above.

The groups were similar ($p=0.13$) regarding the

Table 3. Changes in sexual function during disease or after treatment.

	Untreated $n=20$	Treated $n=16$	Reference $n=18$	
Negative effect on sexual function:				
Vascular disease/treatment	8 (40)	11 (69)	5 (28)	$p=0.050$
Other factor/general health	9 (45)	10 (62)	6 (33)	$p=0.234$
Change of lubricative function				
Yes	8 (67)	5 (36)	4 (25)	
No	4 (33)	9 (64)	12 (75)	$p=0.097$
Not relevant/no answer	8	2	2	
Change of orgasm				
Yes	6 (43)	4 (31)	4 (25)	
No	8 (57)	9 (69)	12 (75)	$p=0.657$
Not relevant/no answer	6	3	2	
Poor lubrication during intercourse				
Yes	7 (64)	5 (45)	4 (25)	
No	4 (36)	6 (55)	12 (75)	$p=0.132$
Not relevant/no answer	9	5	2	

Number of patients in each group is presented with percentages in brackets. Significance analysed with three-way Chi-squared test.

Table 4. Findings at gynaecological examination.

	Untreated $n=18$	Treated $n=16$	Reference $n=18$	
Vulva sensibility				
No deficit	16 (89)	9 (56)	14 (78)	$p=0.111$
Affected	2 (11)	7 (44)	4 (22)	
Bulbus cavernous reflex				
No deficit	16 (89)	10 (77)	16 (89)	$p=0.673$
Affected	2 (11)	3 (22)	2 (11)	
Not examined	0	3	0	
Levator muscle function				
No deficit	16 (89)	12 (86)	17 (94)	$p=0.845$
Affected	2 (11)	2 (14)	1 (6)	
Not examined	0	2	0	
Anal sphincter function				
No deficit	15 (83)	8 (67)	17 (94)	$p=0.158$
Affected	3 (17)	4 (33)	1 (6)	
Not examined	0	4	0	

Percentage in brackets. Analysed with three-way Chi-squared test. Two women in the *untreated* group and four in the *treated* group did not accept a complete gynaecological examination, accounting for the missing data.

frequency of hormone replacement therapy (HRT), which may affect the results at the gynaecological examination. In the *untreated* group 3/6 with a deficit were currently using HRT, as compared to 4/9 among the *treated* and 3/5 in the *reference* group.

Discussion

The first description of sexual dysfunction in men suffering from AIOD was made by Leriche in 1923.[9,10] Since then several reports have confirmed the impact of a decreased pelvic blood flow on male sexuality, predominantly erectile dysfunction.[1,2,11] It is also well known that iatrogenic damage to nervous tissue during aortoiliac surgery causes ejaculatory disorders requiring vascular surgeons to use a meticulous and non-traumatic technique when dissecting the aorta.[12] This also reflects the attitude that sexuality is an important aspect of life in middle-aged and elderly men. One possible explanation for the lack of literature on this problem in women might be its complexity and consequently the difficulty of studying it. The influence of cultural aspects on gender differences or lack of interest amongst predominantly male vascular surgeons may also be a factor. The development of modern sexological research has given the opportunity to investigate this problem in women also. The present study focused on the patients' own evaluation of sexual function at different times related to onset of vascular

disease as well as its treatment. It has also tried to cover objective physical disturbances related to sexuality. Simple physical methods for evaluation of sensibility of the vulva as well as relevant pelvic functions were used because there are no simple specific methods available for determining these qualities. An important prerequisite for its performance has been cooperation with experienced gynaecologists with a special interest in sexology. Their experience and technique during the structured interview made it possible to obtain information of acceptable validity regarding sexual function even several years ago. To be able to establish a personal contact between patient and examiner, the structured interview and the gynaecological examination were performed by the same examiner, thereby not permitting the examiner to be completely blinded.

Since sexual activity with intercourse is common among women up to the age of 70, this age limit was used as an inclusion criteria.[13,14] Besides localised lesions in the pudendal arteries of men, the exact type and distribution of vascular lesions associated with sexual dysfunction is vaguely defined, even though vasculogenic impotence is common in men with AIOD.[15,16] This study was designed to describe sexual dysfunction in a group of women with AIOD requiring open surgery or endovascular intervention. The studied patients had a variety of combinations of significant lesions in relevant arteries. Some had mainly unilateral lesions which, according to previous reports, might cause vasculogenic impotence in men by a steal-phenomenon.[17,18]

In addition to the studied vascular disease and its treatment, sexual function is influenced by multiple factors, i.e. the individual social situation.[7] There was, however, no difference between the patient groups and references in this respect. This is also true for the observed decrease in sexual interest and activity over time, a finding that previously has been described as normal for this age group.[13,14] HRT counteracts mucosal atrophy in the vulva–vagina and may cause increased general well-being, thereby indirectly improving sexual function.[19] The extent of HRT in the studied groups did not differ, nor did the women treated with HRT differ from the others regarding deficits at gynaecological examination. There is a controversy regarding the effects of previous hysterectomy on sexual function with reported improvements as well as deteriorations.[19,20] However, this operation was rare and equally distributed among the studied groups.

As expected, women examined before treatment, while still suffering from claudication, rest pain or ulceration, experienced a significant negative effect on their physical well-being from their disease compared to the other groups. Impaired physical well-being due to chronic disease, i.e. multiple sclerosis and diabetes, is known to negatively affect sexual function in women.[21] It seems a paradox that, after treatment for AIOD, women with physical well-being equal to the *reference* group experienced a significantly higher rate of negative effects of the disease or its treatment on their sexual life than the *untreated* group. This discrepancy is not explained by differences in physical or psychological well-being nor by the relationship to their partner. Another possible explanation could be that a higher number of women in the *treated* group were not satisfied with the extent of their sexual life, a finding which, however, was not statistically significant. The improved physical well-being might be accompanied by more expectations at the same time as they have realised the importance of their chronic disease. Possibly the accumulated effect of the disease and its treatment might explain this difference.

Significantly more women were smokers in the *treated* group. Smoking has been reported to increase the risk of arteriosclerotic lesions in pudendal and penile arteries of men, giving erectile dysfunction, however, not to affect sexual function as such.[22] No reports have been found that prove sexual function to be affected by smoking in women. Hypertension does not affect female or male sexual function. Its treatment, however, is reported to affect male, but not female sexual function.[23] Consequently, the differences between the groups regarding smoking and hypertension should not have an impact on our results. It is also noteworthy that all groups rated their sexual desire as well as the importance of a sexual life equally.

There was no difference in ability to obtain orgasm between the groups, but there was a trend among the *untreated* group towards a negative effect on lubrication after onset of vascular disease. Lubrication problems seemed more common among the *untreated* group 8/12 (67%) as compared to the *reference* group 4/16 (25%). The rate of lubrication problems observed in our patient groups is of an expected magnitude compared to previous studies in men.[1,2] Lubrication is dependent on sexual arousal, hormonal status, autonomic nerve function and pelvic blood flow as well as psychosocial factors. Our groups were similar regarding social situation, HRT and access to sexual encounters. This supports the fact that an impaired blood flow or nerve damage are explanations for our observations of disturbed lubrication.

The negative effects of atherosclerotic lesions, obstructing pelvic blood flow on vaginal engorgement and clitoral erection, is supported by a recent experimental

study in New Zealand rabbits.[24] There are also previous studies reporting on a regained sexual function in 25% of impotent men after aortoiliac vascular reconstruction, as well as improved sexual function and increased penile–brachial indices in men after femorofemoral bypass.[17,18,25,26] Those studies support the importance of an improved pelvic blood flow for the sexual function in these patient groups. Any indications of such beneficial effects could, however, not be demonstrated in our *treated* group. Previous large studies in men show that 20–35% suffer iatrogenic damage to the pudendal nerve during aortoiliac surgery causing retrograde ejaculation.[3–5] Forty-four per cent of the *treated* group were found to have uni- or bilateral disturbance of vulval sensibility which may have been caused by a pudendal nerve injury. All groups had disturbances in vulval sensation indicating that other pathogenic mechanisms, like microcirculatory impairment, as described in prediabetic men, or simply ageing and atrophy, may contribute to this observation.[27] Another explanation for impaired sensibility in the patient groups may be ischaemic nerve damage secondary to their AIOD. Previous reports on the impact of pelvic surgery on female sexual function have presented different results rating from no effect at all to a negative effect in 37%.[19] Disturbances in bulbocavernous and levator ani functions were rare and equal between the groups. One-third of the *treated* group had a disturbed anal sphincter tone probably caused by iatrogenic damage. All studied neurological functions are basically dependent on the pudendal nerve, and the uneven individual distribution of disturbances is likely to be related to differences in extent and location of injury to this nerve.

From this study describing the quality of sexual function among women suffering from AIOD, it can be concluded that the disease significantly affects patients' physical well-being. Furthermore, their sexual function seems to be negatively affected by the disease or its treatment, similar to that previously described in men. Even though this study is limited by its size and its partly retrospective design, we advocate our awareness of this problem among women and a similar level of technical caution as in men during aortic surgery. Even though no significant differences were found in the present study between women treated with PTA or major vascular reconstructions, the development of endovascular methods will probably decrease the risk of iatrogenic damages in both sexes. It is important to emphasise that sexual dysfunction must be considered as a "couples disease". This implies methodological difficulties when the problem is under investigation and also that knowledge or improvements achieved are of mutual interest for both sexes. Further studies in this field are indicated, and a prospective study on sexual function pre- and postoperatively in the same individuals is already under way at our institution.

Acknowledgements

The financial support of the Vårdal foundation, the Swedish Heart and Lung Foundation and the Torsten and Ragnar Söderbergs Foundation are gratefully acknowledged.

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Accepted 15 October 1998