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IMPACT OF STRESS URINARY INCONTINENCE SURGERY ON QUALITY OF LIFE

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Summary.- *OBJECTIVES: To evaluate the quality of life of patients with stress urinary incontinence (SUI) operated in the Department of Urology at the Complejo Hospitalario Universitario in Albacete (CHUA).*

METHODS: Between November 2001 and December 2005, 126 patients with SUI have completed a questionnaire in our centre, before and after undergoing surgery with sling techniques. The questionnaire was the King's Health Questionnaire (KHQ), which is a specific instrument for the measurement of quality of life in patients with urinary incontinence.

RESULTS: Mean patient`s age was 57.09 years (DE: 9.57). Twelve women (9.5%) had history of previous urinary incontinence surgery. Mean urinary incontinence evolution time was 114.48 months, with a median of 96 months. 38 patients (30.2%) did not present cystocele, 61 (48.4%) presented grade III cystocele, 25 (19.8%) grade II, and 2 (1.6%) grade I. Before surgery, the scale with best score was Personal relationships, with a mean score of 26.8, whereas the scale with worst scores was Impact of urinary incontinence, with a mean score of 82.96.

All operations performed consisted in various techniques of transvaginal slings, except one case (0.8%) in which the Kelly technique was performed.

Impact of urinary incontinence was the scale with a greater number of patients improving after surgery; 82.9% of the patients (101 cases) gave a better score. The scales showing greater differences of the mean value comparing before/after surgery were impact of urinary incontinence, limitation on the daily life activity, and limitation on social activity. Personal relationships and General health were the two with the smallest improvements.

CONCLUSIONS: Surgery demonstrated to improve the symptoms secondary to this disease, therefore, it results in an improvement of the quality of life that is evident in all scales of the questionnaire, mainly in the impact of urinary incontinence, limitations on physical activity, limitations on daily life, and limitation on social activity scales.

Keywords: *Incontinence. Surgery. Quality of life. King's Health Questionnaire.*

Resumen.- *OBJETIVO: Valorar la calidad de vida de las pacientes con incontinencia urinaria de esfuerzo (IUE), intervenidas en el Servicio de Urología del Complejo Hospitalario Universitario de Albacete (CHUA).*

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MÉTODO: Entre noviembre de 2001 y diciembre de 2005, se han encuestado en nuestro centro a 126 pacientes afectas de IUE, antes y después de ser intervenidas con técnicas de cabestrillo, mediante el King's Health Questionnaire (KHQ), el cual es un instrumento específico para la medida de la calidad de vida en pacientes con incontinencia urinaria.

RESULTADOS: La edad media de las pacientes fue de 57,09 años (DE: 9,57). Tuvieron antecedentes de cirugía por incontinencia urinaria 12 mujeres (9,5%). La media de evolución de la incontinencia urinaria fue 114,48 meses, con una mediana de 96 meses. No presentaban ningún grado de cistocele 38 pacientes (30,2%) y del resto de mujeres con cistocele, en 61 casos éste fue de grado III (48,4%); en 25 de grado II (19,8%) y en 2 de grado I (1,6%). Antes de la cirugía la escala mejor puntuada fue la de Relaciones personales con una puntuación media de 26,8, mientras que la escala peor puntuada fue la del Impacto de la incontinencia urinaria, con una puntuación media de 82,96. Todas las cirugías realizadas consistieron en diversas técnicas de cabestrillo por vía transvaginal, salvo un caso (0,8%) en el que se realizó según técnica de Kelly. La escala que mayor número de pacientes mejoraron tras la cirugía, fue la del Impacto de la Incontinencia Urinaria, la cual puntuaron mejor un 82,9% (101 casos) de las enfermas. Las escalas que presentaron mayor diferencia de medias entre las puntuaciones de antes y después de la cirugía fueron la del Impacto de la I.U., la de Limitaciones de la actividad física, Limitación de la actividad de la vida diaria y Limitación de actividad social. Las que mejoraron en menor medida fueron las de Relaciones personales y Salud general.

CONCLUSIONES: La cirugía demostró una mejoría en los síntomas que produce dicha patología repercutiendo, por tanto, en una mejoría de su calidad de vida, como es patente en todas las escalas del cuestionario y sobre todo en las escalas del Impacto de la I.U., Limitación de la actividad física, Limitación de la actividad de la vida diaria y Limitación de la actividad social.

Palabras clave: *Incontinencia. Cirugía. Calidad de vida. Cuestionario de Salud de King.*

INTRODUCCIÓN

In 1979 Bates et al. (1) defined urinary incontinence (UI) as the involuntary loss of urine through the urethra that is objectively demostrable and causes social or hygienic problems. In 2002 the International Continence Society (ISC) updated the terminology and definitions to unify and use uniform, identical terms for lower urinary tract dysfunction conditions, such as UI, and defined stress urinary incontinence as the "involuntary loss of urine occurring when, in the absence of a detrusor contraction, the intravesical pressure exceeds the maximum urethral pressure"(2).

UI affects approximately 6% of the U.S. population and, although the estimated prevalence among adults is 15% to 30%, the condition presents in all age groups, with a progressive rise as age increases. The condition also has a high cost, estimated at 10 billion dollars a year (3), and is recognized in Spain as a health problem implying high expenditures for the public health care systems. In Area 6 in Madrid, Spain, UI accounted for 8.8% of all pharmacy costs in 2000 (4).

Interest in the concept and measurement of quality of life in this area of health has arisen for several reasons: first, health is understood as a state of full physical, psychological, and social well-being, not merely the absence of illness and ailments; second, the extraordinary development of new pharmacological products and health technologies has fostered an interest in measuring "quality of life" to provide a more comprehensive, integral, and valid assessment of health of an individual or group (5).

Therefore, physical and emotional well-being are the two most important aspects, although others should also be considered, including sleep, anxiety, fatigue, depression, communication, partner relationships, and social relationships (6). All of these areas are clearly affected in patients with UI. As a result, we decided to measure quality of life in women with stress urinary incontinence, based on a quality-of-life questionnaire specifically designed for incontinence, King's Health Questionnaire.

MATERIALS AND METHODS

The study was designed as a quasi-experimental, pretest-posttest analysis of a single group. The study specifically analyzed outcomes reported by UI surgery patients on the waiting list and 6 months after the surgery had been performed.

The outcomes were analyzed using King's Health Questionnaire (KHQ), a specific instrument to measure quality of life in patients with UI. This questionnaire consists of 21 items distributed in 9 domains: general health perception, incontinence impact in their life (to prevent confusion with these two domains, we analyzed these as a single domain designated "general health"), role limitations, social limitations, physical limitations, personal relationships, emotions, sleep/energy, and incontinence impact. Each KHQ

item was based on a Likert scale with 4 possible options. The score for each domain ranged from 0 (best quality of life) to 100 (worst quality of life). The questionnaire is designed to be self-administered (7).

The study started in November 2001 and ended in December 2005. Consecutive sampling was used to select a total of 126 patients in the Urology Department of the Hospital and University Complex of Albacete.

In addition to the KHQ questionnaire score, data were collected on the following:

- Duration of incontinence (months)
- History of urinary tract infections
- Daytime urinary frequency (minutes)
- Nighttime urinary frequency (number of times)
- Number of leakage episodes per day in the last week
- Number of pads used per day
- Presence of cystocele
- Grade of cystocele
- Urinary urge
- Presence of urge incontinence

The following surgical data (including information on the preoperative period and the procedure itself) were also analyzed:

- Surgical risk (American Society of Anesthesiologists Classification)
- Type of surgery performed
- Associated surgeries
- Presence of perioperative complications
- Presence of immediate postoperative complications

Finally, other variables analyzed were age, body mass index, presence of chronic diseases, patient-reported use of long-term medications, and obstetric or gynecologic history.

A descriptive analysis of each study variable was performed, in addition to a bivariate analysis using independence tests to compare proportions observed in independent groups (chi-squared), Mantel-Haenszel linear trend test, and Student t-test-Fisher test to study the relationship between a binary and a quantitative variable. If the applicable conditions for all these tests were not met, the respective nonparametric tests were used.

Linear regression was used to construct different models to assess the variables that were independently associated with a higher score in each of the questionnaire domains. A stepwise method was used to introduce the variables.

In order to assess the effect on quality of life (response variable) of incontinence surgery (exposure variable), a logistic regression model was constructed using the logistic regression procedure of the SPSS system, introducing adjustment variables to control for confounding and also verifying the existence of effect modifier variables or interactions. The purpose of the analysis was to estimate the partial regression coefficients that express the weight of the different independent variables in explaining the variability of improvement in the quality of life scales. The dependent variables considered were the decrease in the score of each KHQ domain (0, no improvement; 1, improvement) 6 months after the first assessment.

RESULTS

The mean age of the 126 women in the sample was 57.09 years, with a standard deviation (SD) of 9.57 and a 95% confidence interval (95% CI) between 55.40 and 58.78.

Eighty-eight (69.8%) patients reported some chronic illness not related to their urologic condition and 85 (67.5%) women were taking some kind of medication unrelated to medical treatments for UI. The most commonly used drugs were hypotensive agents (41.18%), followed by nonsteroidal anti-inflammatories (27.06%).

Incontinence surgery had already been performed in 12 (9.5%) women, 2 of them twice (Marshall-Marchetti-Krantz procedure in 7 occasions, Kelly plication in 3, Burch in 2, and indeterminate in 1 patient).

The mean duration of UI was 114.48 months. Daytime urinary frequency was 60 to 120 minutes in 76 patients, and 33 patients awoke at night to urinate 3 times.

During the previous week, 73 (57.94%) women had more than 10 episodes of urine leakage per day. Urinary urge and urge urinary incontinence were observed on 18 cases, respectively (14.3%).

Regarding the presence of cystocele, 38 (30.2%) patients reported no cystocele, 2 (1.6%) were Grade I, 25 (19.8%) were Grade II, and 61 (48.4%) were Grade III.

A urinary tract infection episode was reported by 46 (36.5%) patients, and the presence of urinary tract infection was associated with the presence of cystocele, such that a history of such infection was

reported by 26.3% of women without cystocele compared with 40.9% who had some grade of cystocele (p = 0.05).

The domain of personal relationships showed the best KHQ score before surgery (mean, 26.89; 95% CI, 21.16-32.63), whereas incontinence impact had the worst score (mean, 82.96; 95% CI, 80.15-85.77).

The preanesthesia assessment for patients who underwent surgery for UI was performed using the American Society of Anesthesiologists Classification: ASA I in 23 patients (18.3%), ASA II in 87 (69%), and ASA III in 16 (12.7%).

The procedures were based on various transvaginal sling techniques, except for 1 (0.8%) patient who only underwent anterior colporraphy consisting of Kelly plication. In all other cases, the type of incontinence surgery most commonly used was urethropexy with transobturator tape (TOT), performed in 62 (49.2%) patients, followed by urethropexy with bone anchoring using In-Fast sling in 48 (38.1%) and tension-free vaginal tape (TVT) in 15 (11.9%). In addition to the primary incontinence procedure, a total of 7 procedures associated with the operation were also performed, including 6 posterior colporrhaphies and 1 anterior colporrhaphy.

Six (4.8%) patients presented perioperative complications, which included 5 cases of bladder rupture and 1 of vaginal bleeding with subsequent pelvic bruising. Immediate postoperative complications were observed in 5 (4.0%) cases, with a prevalence of 4.8%. The only postoperative complication was urinary retention, which required the use of a bladder catheter for more than 2 days. Lastly, 13 (10.3%) patients presented late complications related to incontinence. The late complications consisted of 8 cases of sling rejection, 4 of urinary urge that required treatment with anticholinergics, and 1 case of sling migration to the urethra. Table I lists the complications according to type of surgery and percentage of success.

After incontinence surgery, the mean scores for all KHQ questionnaire domains were significantly lower than those previously presented by the patients. Figure 1 and Table II show the scores for the various domains before and after surgery and the difference in the mean values of each domain.

The domains with the largest difference in mean values between preoperative and postoperative scores were incontinence impact, physical limitations, role limitations, and social limitations (Table II). Personal relationships and general health also improved, but to a lesser extent.

The domain that improved in most patients was incontinence impact, which was scored better by 101 (82.9%) patients in the sample after surgery. In contrast, only 45 (35.7%) women had an improved personal relationships score after surgery.

The improvement in the postoperative score for the KHQ general health domain was related to fewer pregnancies (p = 0.042), lower nighttime urinary frequency before surgery (p = 0.035), and a lower mean number of leakage episodes per day during the week after surgery (p < 0.0001) (Table III), as well as no history of medical treatment for incontinence before surgery (p = 0.011), history of treatment by Kegel exercises (p = 0.05), no history of urinary urge (p = 0.03), no urge incontinence (p = 0.03), preoperative daytime urinary frequency under 120 minutes (p = 0.001), and no daytime urinary leaks during the week after surgery (p < 0.0001) (Table IV).

The postoperative improvement in role limitations was related to a higher preoperative score (poorer quality of life) in the following domains: physical limitations (p = 0.007), social limitations (p = 0.017), personal relationships (p = 0.041), and emotions (p = 0.032), as well as fewer urine leakage episodes per week after surgery (p = 0.003) (Table III). Likewise, the score in this scale improved among patients who did not present late complications (p < 0.0001), those who presented 5 or more episodes of urine leakage per day before surgery (p < 0.001), and those who reported they were completely dry after surgery (p < 0.0001) (Table IV).

The postoperative improvement in the physical limitations score correlated to lower age (p = 0.05), and a higher mean number of leakage episodes per day in the week before surgery (p = 0.033). (Table III), as well as history of treatment by Kegel exercises (p = 0.033), presentation of cystocele, and a higher grade of cystocele (p = 0.031), no history of urinary urge (p = 0.037), no late complications (p = 0.022), 5 or more episodes of urine leakage per day during the week before surgery (p < 0.0001), and remaining completely dry after surgery (p < 0.0001) (Table IV).

The variables related to a postoperative improvement in the KHQ score for social limitations were older age at adnexectomy (p = 0.009), higher mean number of urine leakage episodes per day during the week before surgery (p = 0.006), longer history of using Kegel exercises (p = 0.004), higher preoperative scores (poorer quality of life) in the ge-

neral health domain (p = 0.005), role limitations (p < 0.0001), physical limitations (p < 0.0001), personal relationships (p = 0.05), emotions (p = 0.049), and incontinence impact (p = 0.02) (Table III), as well as patients who did not present urge incontinence (p = 0.047), nonexistence of postoperative cystocele (p = 0.037), nonexistence of late postoperative complications (p = 0.006), 5 or more episodes of urine leakage per day during the week before surgery (p < 0.0001), and remaining completely dry after surgery (p < 0.0001) (Table IV).

The variables related to an improvement in the personal relationships score after surgery were younger age at menopause (p = 0.004), poorer quality of life before surgery in the role limitations domain (p = 0.009) and a higher mean number of leakage episodes per day during the week before surgery (p = 0.0022) (Table III), as well as no late postoperative complications (p = 0.022), plus 5 or more urine leakage episodes per day during the week before surgery (p = 0.031) (Table IV).

The variables related to an improvement in the postoperative KHQ emotions score were a higher mean number of leakage episodes per day for the week before surgery (p < 0.0001), younger age (p = 0.045), poorer quality of life before surgery in the general health domain (p = 0.005), and role limitations (p = 0.031) (Table III). No late postoperative complications (p = 0.022), 5 or more urine leakage episodes per day during the week before surgery (p = 0.001), and no episode of urine leakage after surgery (p = 0.001) (Table IV).

The variables related to an improvement in the postoperative KHQ sleep/energy score were a longer duration of UI (p = 0.016), older mean age (p = 0.029), higher preoperative nighttime urinary frequency (p = 0.01), poorer quality of life before surgery in the general health domains (p = 0.048), role limitations (p = 0.003), physical limitations (p = 0.029), social limitations (p = 0.005), personal relationships (p = 0.005), emotions (p = 0.02), and incontinence impact (p = 0.015) (Table III), as well as 5 or more urinary leakage episodes per day during the week before surgery (p = 0.016) and be completely dry after surgery (p = 0.008) (Table IV).

The variables related to an improvement in the postoperative score for incontinence impact were fewer nighttime micturitions after surgery (p = 0.001) (Table III), as well as micturition intervals above 120 min after surgery (p = 0.005), no urinary leakage episodes after surgery (p < 0.0001), and absence of late complications (p < 0.0001) (Table IV).

TABLE I. PROCEDURE-RELATED COMPLICATIONS AND SUCCESS.

	PERIOPERATIVE COMPLICATIONS	**IMMEDIATE POSTOPERATIVE COMPLICATIONS**	**LATE POSTOPERATIVE COMPLICATIONS**	**SUCCESS (PATIENTS REMAINING DRY)**
In-Fast Sling (n=48)	2 bladder rupture (4.16%) 1 pelvic bruising (2.08%)	2 urine retention (4.16%)	5 mesh rejections (10.41%) 2 urinary urge (4.16%)	70,8%
TVT (n=15)	1 bladder rupture (6.66%)		1 urinary urge (6.66%)	73,3%
TOT (n=62)	2 bladder rupture (3.22%)	2 urine retention (3.22%)	3 mesh rejections (4.83%) 1 urinary urge (1.61%) 1 mesh migration toward urethra (1.61%)	77%
Kelly (n=1)		1 urine retention (100%)		100%

TABLE II. DIFFERENCE IN MEAN VALUES FOR KHQ DOMAINS FOLLOWING URINARY INCONTINENCE SURGERY

DOMAINS		Related Differences			
	Mean	SD	95% CI		p
General health	21,65	25,40	17,17	26,13	<0,0001
Role limitations	46,29	43,96	38,54	54,04	<0,0001
Physical limitations	55,15	40,13	48,08	62,23	<0,0001
Social limitations	41,66	45,20	33,69	49,63	<0,0001
Personal relationships	15,08	24,91	10,35	19,81	<0,0001
Emotions	38,71	40,14	31,63	45,70	<0,0001
Sleep/energy	26,26	37,70	19,59	32,94	<0,0001
Incontinence impact	62,07	34,64	55,95	68,17	<0,0001

Table V lists the variables that showed a statistically significant relationship with a greater improvement in the various KHQ questionnaire domains in the multiple linear regression analysis.

DISCUSSION

Quality-of-life questionnaires are important tools for assessing the therapeutic outcome of conditions that interfere with quality of life in women with UI, particularly if these tools are used along with questionnaires to measure UI symptoms and problems associated with the symptoms. According to such questionnaires, patients with UI are clearly affected in terms of quality of life and limited in both their physical activities and body image. Quality of life worsens with age, higher degree of incontinence, greater urinary symptoms, and when episodes of urinary tract infection are associated with the condition (8). However, the use of questionnaires should be standardized to provide references that can be used when comparing results between series and between different procedures.

he development of new surgical techniques to treat stress urinary incontinence has led to better outcomes and lowered the number of complications, resulting in favorable trends in postoperative urinary changes (9) and a possible improvement in quality of life following the procedure. The literature contains various quality-of-life studies based on several questionnaires and conducted among patients who have undergone UI surgery (10-14) Clyne et al. (15) and Walsh et al. (16) based their studies on the same questionnaire as we did, using it to assess quality of life in women with UI. In general, all questionnaires were specific for patients with UI, but also assessed other domains such as mental health, feeling of pain, sexual satisfaction, etc.

The quality of life of our patients improved in all KHQ domains after incontinence surgery, presen-

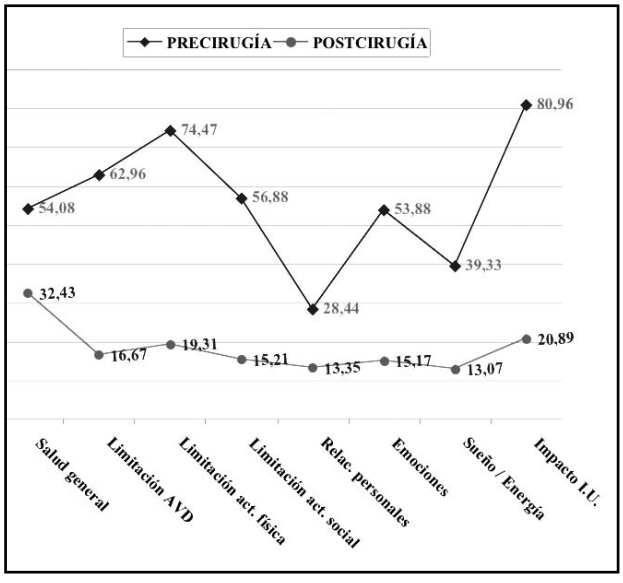

FIGURA 1. Mean khq scores before and after urinary incontinence surgery.

TABLE III. VARIABLES RELATED TO AN IMPROVEMENT IN KHQ DOMAIN SCORES AFTER SURGERY.

GENERAL HEALTH	**IMPROVEMENT Mean (SD)**	**NO IMPROVEMENT Mean (SD)**
Number of pregnancies	3,31 (1,8)	4,00 (1,6)
Nighttime urinary frequency before surgery	1,74 (1,5)	2,47 (1,7)
Number of leakage episodes per day during week after surgery	0,43 (1,8)	4,72 (5,00)
ROLE LIMITATIONS		
Number of leakage episodes per day during week after surgery	8,10 (6,8)	11,10 (5,7)
Physical limitations before surgery	79,16 (26,26)	59,40 (39,92)
Social limitations before surgery	61,80 (37,8)	41,11 (40,76)
Personal relationships before surgery	29,74 (34,14)	16,77 (25,03)
Emotions before surgery	57,75 (36,07)	41,48 (35,12)
PHYSICAL LIMITATIONS		
Mean patient age	56,27 (9,4)	60,37 (9,7)
Number of leakage episodes per day during week before surgery	10,80 (5,4)	8,28 (6,5)
SOCIAL LIMITATIONS		
Mean age at adnexectomy	49,70 (7,6)	38,50 (2,1)
Number of leakage episodes per day during week before surgery	11,45 (5,5)	8,26 (5,6)
Treatment with Kegel exercises (months)	0,58 (0,8)	1,76 (4,07)
General health before surgery	57,80 (16,7)	47,10 (20,8)
Role limitations before surgery	71,50 (32,3)	46,90 (36,5)
Physical limitations before surgery	82,70 (25,0)	59,10 (31,6)
Personal relationships before surgery	30,90 (34,7)	19,40 (26,7)
Emotions before surgery	58,20 (35,1)	45,70 (37,6)
Incontinence impact before surgery	85,70 (12,9)	77,70 (19,4)
PERSONAL RELATIONSHIPS		
Mean age at menopause	45,40 (5,1)	48,60 (5,8)
Number of leakage episodes per day during week before surgery	11,80 (5,5)	9,30 (5,1)
Role limitations before surgery	74,10 (32,0)	50,20 (36,6)
EMOTIONS		
Mean age	56,10 (9,2)	59,90 (10,1)
Number of leakage episodes per day during week before surgery	11,30 (6,0)	7,60 (5,5)
General health before surgery	57,30 (16,7)	45,00 (21,8)
Role limitations before surgery	67,00 (34,7)	51,50 (36,2)
SLEEP/ENERGY		
Mean age	58,50 (9,2)	54,70 (9,5)
Duration of incontinence (months)	133,70 (110,4)	80,50 (80,9)
Nnumber of micturitions per night before surgery	2,24 (1,6)	1,49 (1,4)
General health before surgery	56,90 (17,1)	49,80 (20,8)
Role limitations before surgery	71,20 (32,5)	51,30 (37,2)
Physical limitations before surgery	79,00 (27,0)	67,20 (32,1)
Social limitations before surgery	64,60 (37,0)	44,70 (40,0)
Personal relationships before surgery	31,60 (33,7)	20,00 (30,1)
Emotions before surgery	60,10 (36,9)	44,70 (34,2)
Incontinence impact before surgery	85,90 (13,4)	78,80 (18,4)
INCONTINENCE IMPACT		
Number of nighttime micturitions after surgery	0,91 (1,7)	2,18 (1,7)

TABLE IV. VARIABLES RELATED TO AN IMPROVEMENT IN KHQ DOMAIN SCORES AFTER SURGERY.

		% IMPROVEMENT	% NO IMPROVEMENT
GENERAL HEALTH			
Medical treatment for urinary incontinence	Yes	28,9	71,1
	No	52,8	47,2
Kegel exercises	Yes	79,6	20,4
	No	65,3	34,7
Urinary urge	Yes	50,0	50,0
	No	75,0	25,0
Urge incontinence	Yes	50,0	50,0
	No	75,0	25,0
Daytime urinary frequency after surgery > 210 min	Yes	100,0	0,0
	No	36,0	64,0
Number of leakage episodes per day after surgery	Completely dry	69,5	20,5
	Some leakage	3,5	96,5
ROLE LIMITATIONS			
Late complications	Yes	38,5	61,5
	No	80,5	19,5
Number of leakage episodes per day before surgery	≤ 4	45,0	55,0
	≥ 5	82,1	17,9
Number of leakage episodes per day after surgery	Completely dry	83,0	17,0
	Some leakage	40,0	60,0
PHYSICAL LIMITATIONS			
Late complications	Yes	53,8	46,2
	No	83,2	16,8
Kegel exercises	Yes	88,9	11,1
	No	76,3	26,4
Urge incontinence	Yes	38,9	61,1
	No	83,3	16,7
Cystocele	No cystocele	84,2	15,8
	Grade I	0,0	100,0
	Grade II	76,0	24,0
	Grade III	82,0	18,0
Number of leakage episodes per day before surgery	≤ 4	45,0	55,0
	≥ 5	86,8	13,2
Number of leakage episodes per day after surgery	Completely dry	88,7	11,3
	Some leakage	35,0	85,0
SOCIAL LIMITATIONS			
Late complications	Yes	30,8	69,2
	No	69,0	31,0
Postoperative cystocele	Yes	28,6	71,4
	No	67,2	32,8
Urge incontinence	Yes	44,4	55,6
	No	68,5	31,5
Number of leakage episodes per day after surgery	Completely dry	74,5	25,5
	Some leakage	15,0	85,0
Number of leakage episodes per day before surgery	≤ 4	20,0	80,0
	≥ 5	73,6	26,4
PERSONAL RELATIONSHIPS			
Late complications	Yes	9,1	90,9
	No	44,9	55,9
Number of leakage episodes per day before surgery	≤ 4	17,6	82,4
	≥ 5	45,7	54,3
EMOTIONS			
Late complications	Yes	38,5	61,5
	No	77,9	22,1
Number of leakage episodes per day before surgery	≤ 4	45,0	55,0
	≥ 5	79,2	20,8
Number of leakage episodes per day after surgery	Completely dry	79,2	20,8
	Some leakage	45,0	55,0
SLEEP/ENERGY			
Number of leakage episodes per day before surgery	≤ 4	35,0	65,0
	≥ 5	63,8	36,2
Number of leakage episodes per day after surgery	Completely dry	64,2	35,8
	Some leakage	31,6	68,4
INCONTINENCE IMPACT			
Late complications	Yes	53,8	46,2
	No	90,3	9,7
Urinary frequency after surgery	< 120 min.	76,0	24,0
	> 120 min.	93,4	6,6
Number of leakage episodes per day after surgery	Completely dry	96,2	3,8
	Some leakage	35,0	65,0

TABLE V. VARIABLES ASSOCIATED WITH AN IMPROVEMENT IN THE KHQ DOMAINS AFTER SURGERY IN THE LINEAR REGRESSION MODEL.

GENERAL HEALTH			
VARIABLE	**COEFFICIENT**	**95% CI**	**p**
Number of leakage episodes per day before surgery	18,498	8,516 / 28,471	<0,0001
Number of leakage episodes per day after surgery	-28,119	-38,192 / -18,046	<0,0001
Late postoperative complications	-15,903	-28,045 / -3,761	0,011
History of hysterectomy	9,794	1,782 / 17,805	0,017
History of urinary tract infection	10,347	2,743 / 17,951	0,008
Daytime urinary frequency after surgery	9,693	1,610 / 17,777	0,019
CONSTANT	***0,938***	***-9,809 / 11,686***	***0,173***
ROLE LIMITATIONS			
VARIABLE	**COEFFICIENT**	**95% CI**	**p**
Number of leakage episodes per day before surgery	29,269	10,085 / 48,454	<0,0001
Number of leakage episodes per day after surgery	-35,796	-54,576 / -17,016	<0,0001
Nighttime urinary frequency after surgery	-9,661	-15,736 / -3,586	0,002
Body mass index	-2,163	-3,656 / -0,671	<0,0001
Physical limitations before surgery	0,518	0,255 / 0,780	0,008
Personal relationships before surgery	0,215	0,013 / 0,416	0,005
Sleep/energy before surgery	0,276	0,067 / 0,484	0,01
CONSTANT	***40,609***	***-2,305 / 83,523***	***0,06***
PHYSICAL LIMITATIONS			
VARIABLE	**COEFFICIENT**	**95% CI**	**p**
Late postoperative complications	-147,167	-176,658 / -118,342	<0,0001
Number of abortions	-12,292	-19,496 / -5,087	0,01
Absence of chronic diseases	10,347	-34,846 / -1,023	0,041
Daytime urinary frequency before surgery	-30,208	-50,402 / -10,014	0,009
CONSTANT	***114,167***	***98,134 / 130,199***	***<0,001***
SOCIAL LIMITATIONS			
VARIABLE	**COEFFICIENT**	**95% CI**	**p**
Number of leakage episodes per day before surgery	28,816	-14,157 / 43,474	<0,0001
Number of leakage episodes per day after surgery	-77,464	-90,211 / -63,959	<0,0001
Preoperative limitation in physical activity	1,109	1,005 / 1,322	<0,0001
CONSTANT	***-30,357***	***-45,663 / -15,052***	***<0,0001***
PERSONAL RELATIONSIPS			
VARIABLE	**COEFFICIENT**	**95% CI**	**p**
Urge incontinence	-17,308	-29,995 / -4,621	0,008
Age at menopause	-1,076	-1,915 / -0,238	0,013
Duration of incontinence (months)	0,61	0,019 / 0,102	0,005
Marital status	24,643	6,121 / 43,166	0,01
CONSTANT	***35,193***	***-8,372 / 78,575***	***0,112***
EMOTIONS			
VARIABLE	**COEFFICIENT**	**95% CI**	**p**
Number of leakage episodes per day before surgery	32,957	15,033 / 50,882	<0,0001
Number of leakage episodes per day after surgery	-48,185	-64,324 / -32,046	<0,0001
Daytime urinary frequency after surgery	16,611	2,633 / 30,589	0,02
General health before surgery	0,561	0,176 / 0,946	0,005
Role limitations before surgery	0,252	0,025 / 0,478	0,03
CONSTANT	***-28,597***	***-50,495 / -6,698***	***0,011***
SLEEP/ENERGY			
VARIABLE	**COEFFICIENT**	**95% CI**	**p**
Number of leakage episodes per day after surgery	-47,121	-62,623 / -31,620	<0,0001
Late complications	-24,486	-44,613 / -4,359	0,018
History of urinary tract infection	19,756	7,464 / 32,050	0,002
Role limitations before surgery	0,314	0,110 / 0,517	0,003
Emotions before surgery	0,272	0,093 / 0,451	0,003
CONSTANT	***-0,317***	***-13,970 / 19,909***	***0,9971***
INCONTINENCE IMPACT			
VARIABLE	**COEFFICIENT**	**95% CI**	**p**
Number of leakage episodes per day after surgery	-66,982	-77,792 / -56,172	<0,0001
Number of leakage episodes per day before surgery	33,173	21,805 / 44,542	<0,0001
History of urinary tract infection	12,662	3,459 / 21,784	0,007
Urinary frequency after surgery	9,994	0,362 / 19,626	0,042
CONSTANT	***38,442***	***27,451 / 49,432***	***<0,0001***

ting a more evident improvement in incontinence impact, followed by physical limitations, role limitations, and social limitations. The personal relationships domain remained largely unchanged after surgery, with a mean score slightly below the preoperative score. Incontinence impact improved in more patients after surgery (82.9%), followed by physical limitations (80.2%), and lastly, personal relationships (35.7%).

The incontinence impact domain showed the largest difference in mean values after surgery (62.06 points), as well as the highest percentage of patients who had improved after such surgery.

The improvement in the quality of life of operated patients was clear in all series consulted and ranged between 80% and 96% of cases, (17,18,11,12) and our results were consistent with those previously reported in the literature. A study conducted in the Netherlands used the Incontinence Impact Questionnaire in 809 patients with UI to analyze quality of life before and after surgery at 2, 6, 12, and 24 months and found that the questionnaire score continued to improve over time after the surgery (11). In that study, the mean preoperative score was 58 points, a score that gradually decreased to 12 points at 24 months. The study concluded that the improvement in quality of life is more evident in patients younger than 70 years of age (youngest group); the authors explained this as a result of the high incidence of intrinsic sphincter deficiency in the elderly patients.

A Japanese study in 161 patients with UI operated on for this condition used the Incontinence Impact Questionnaire-7 (IIQ-7) and found that after 2 years, all domains had significantly improved and 88% of patients were satisfied with the outcome of the surgical procedure (19).

Other studies conducted with the same questionnaire we used showed an improvement in all categories except for general health, with younger women reporting a greater improvement (15,16). In general, patients reported a high level of satisfaction with the surgery in both studies.

Lastly, a review of quality-of-life studies among patients in Denver, Colorado (U.S.A.) (20) and London, United Kingdom(21) also confirmed an improvement in postoperative quality of life, with a satisfaction of 95.7% and 94%, respectively.

In our study, the variables most closely associated with an improvement in quality of life after surgery were longer interval between daytime micturitions (> 120 min), no urinary leakage, and no postoperative complications. A longer interval between micturitions gives patients an autonomy they did not previously have and allowed them to undertake activities outside the home that had been previously impossible. No urine leakage (remaining dry) is the variable repeated most often and improves all questionnaire domains and facets because it is the outcome most valued by patients and the main purpose of the procedure. Lack of complications from the surgery was also considered important, as any complications would delay improvements or adversely affect the patients' health if they are in poorer condition than before the surgery due to such complications. Naturally, the improvement in quality of life was greater when the preoperative urinary symptoms were more severe.

In conclusion, UI surgery improves the symptoms caused by the condition and the importance or problems ascribed by the patient to such symptoms. This improvement clearly affects the patients' quality to some extent or another, according to whether they remained completely dry or still had some urine leakage at 1 week. Our study shows that the quality of life of women who undergo UI surgery improves in all domains assessed by the KHQ questionnaire, with the greatest improvement achieved in incontinence impact, followed by the physical limitations, role limitations, and social limitations domains.

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