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Title

Pulsed magnetic stimulation for stress urinary incontinence

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Abstract

Background

There is a distinct gap in success rates between surgical and non-surgical treatments for stress urinary incontinence, although most patients preferred the latter. We evaluated the safety and efficacy of magnetic stimulation for female patients with stress urinary incontinence.

Methods

We conducted a multicenter, randomized trial wherein 120 subjects were randomized 1:1 to either active or sham magnetic stimulation. The primary criterion for response was defined as having at least a 5-point reduction in the International Consultation on Incontinence Questionnaire for Urinary Incontinence-Short Form, supplemented by various secondary outcome measures.

Results

Using the primary criterion, 45 (75.0%) of 60 subjects were treatment responders in the active group compared with 13 (21.7%) of 60 subjects in the sham group (relative risk (RR) 3.46, 95% CI 2.09-5.72, $p<0.001$). Subjects in the active group were statistically significantly more likely to be cured objectively (RR 6.25, 95% CI 2.32-16.87, $p<0.001$) and subjectively (RR 6.33, 95% CI 1.98-20.28, $p<0.001$) compared with the sham group. Changes in incontinence episode frequency, 1-hour pad test, incontinence severity and Patient Global Impression of Improvement were statistically significantly greater in the active group

(p<0.05). Changes in pelvic floor muscle parameters, uroflowmetry parameters and rate of adverse events were not statistically significantly different between groups (p>0.05).

Conclusions

Female patients with stress urinary incontinence who received active magnetic stimulation were significantly more likely to improve and to be cured compared with the sham group. Our data are instrumental in providing an alternative for the majority of patients who prefer non-surgical treatments.

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Introduction

Stress urinary incontinence (SUI) is a common health problem that negatively affects the physical, psychological, social and economic well-being of patients and their families.[1, 2] The 5th International Consultation on Incontinence advocates pelvic floor muscle training (PFMT) as the first line conservative treatment for SUI.[3] However, there is currently no standardized PFMT regimen available.[4, 5] Use of other non-surgical options such as biofeedback, vaginal cones, electrical stimulation and urethral plugs is limited due to side effects, discomfort and invasiveness. Surgical interventions such as midurethral slings have unquestionably superior cure rates of approximately 90%, compared with 30% in PFMT.[6] However, when given options, most patients will choose non-surgical treatments.[7, 8] Furthermore, since prevalence of urinary incontinence (UI) increases with age,[9] patients especially the elderly may have multiple co-morbidities such as ishemic heart disease, hypertension and diabetes, thus increasing the risk of surgery. It is estimated that about two-thirds of patients above 65 years old had multiple significant co-morbidities.[10] Therefore, it is imperative to take into consideration both the patients' preferences and health condition, and the surgeons' judgment instead of focusing on cure/improvement rates exclusively.

Magnetic stimulation (MS), which was developed as an alternative to electrical stimulation, has been used as a non-invasive option for UI with minimal adverse events.[11, 12] The encouraging results of previous studies on MS, its established safety along with the simplicity of treatment procedures motivated our intense interest in this treatment modality. The Fifth

International Consultation on Incontinence emphasized that current evidence is insufficient to guide any recommendation on the use of MS for UI, and that well-powered randomized controlled trials are needed to study the effects of MS in different diagnostic group.[12]

To begin with, we conducted a systematic review to appraise the existing evidence looking at efficacy of MS on UI. We found that most of the published MS studies on SUI had various limitations including small sample size, lack of a placebo group, heterogenous outcome measures and poor reporting.[11] Thus, we designed a multicenter, randomized, double-blind, sham-controlled trial to address these chief limitations noted.[13] We attempt to determine conclusively whether active MS results in higher continence rate compared with sham in SUI patients.

Methods

Study design

The detailed study design has been published previously.[13] Briefly, this study (ClinicalTrials.gov Identifier: NCT01924728) was undertaken in the participating hospitals in Penang, Malaysia. Subjects were assigned in a 1:1 allocation to either the active or sham MS group using a computer-generated, permuted block randomization with variable block sizes. The study was conducted in accordance with the International Committee of Harmonization guidelines for Good Clinical Practice and the Declaration of Helsinki, and it has been approved by the Joint Ethics Committee of the School of Pharmaceutical Sciences, USM-HLWE on Clinical Studies [USM-HLWE/IEC/2013(0006)]. All subjects provided written informed consent.

Patient population

Eligible subjects were female aged 21 years and above, demonstrated urine leak on coughing, had International Consultation on Incontinence Questionnaire for Urinary Incontinence-Short Form (ICIQ-UI SF) score of at least 6 points and were able to carry out one-hour pad test.[13]

Intervention

The device utilized was the QRS-1010 PelviCenter (QRS International, Ruggell, Liechtenstein) which uses electromagnetic pulsing for pelvic floor muscle stimulation. The treatment plan involved 2 sessions per week for 8 weeks (total 16 sessions) of 20 minutes each. Stimulation intensity were gradually increased by amplications of 20% until they received stimuli the maximum tolerable stimulation using a stimulation repetition cycle of 50 Hz in an 8-s “on” and 4-s “off” pulsing manner by a study nurse not involved in patient assessments.

Study measures

Baseline assessments included demographic data, medical history, examination for prolapse,[14] urine analysis, urine pregnancy test, ultrasound scan and uroflowmetry with measurement of post-void residual volume.

The primary outcome measure was the improvement in the SUI severity as measured by the ICIQ-UI SF. The primary criterion for response was defined as having at least 5 point reduction from baseline to 8 weeks in the ICIQ-UI SF score (score range: 0-21).[15, 16] The ICIQ-UI SF, a highly recommended questionnaire by the International Continence Society, was chosen as our primary outcome measure on the basis of the emerging consensus that patient-reported outcomes are the most appropriate when describing treatment success or failure.[17]

The secondary outcome measures included: (i) objective (defined as a leakage of less than 1 gram on the pad test[18]); (ii) subjective cure (defined as 'never' response to question 'How often do you leak urine?' in ICIQ-UI SF); (iii) incontinence episode frequency; (iv) 1-hour pad test; (v) pelvic floor muscle function; (vi) incontinence severity improvement in ICIQ-UI SF category; (vii) Patient Global Impression of Improvement (PGI-I) and (vii) International Consultation on Incontinence Questionnaire-Lower Urinary Tract Symptoms Quality of Life (ICIQ-LUTSqol). All data were collected by blinded assessors. Subjects were assessed at baseline, week 4 and week 8.

Safety was evaluated by adverse events and post-void residual volume. All adverse events were systematically ascertained. The ethical committee convened annually to review study conduct and adverse events.

Statistical analysis

Setting two-sided significance level at 0.05 with 80% power, 120 subjects were required, assuming 60% response in active group and 30% in sham group with 25% attrition.[19-21] Data was analysed according to an 'intention-to-treat' principle. For univariate analysis, chi-square test was used for responder analysis at individual time points. For multivariate analysis, data were analyzed by a longitudinal method using linear mixed model (LMM)[22] and generalized linear mixed model (GLMM).[23] Continuous dependent variables were analyzed with LMM. The primary outcome measure and other dichotomous variables were analyzed using GLMM (binomial logistic regression). We estimated the marginal means of proportions, odds ratios comparing treatments and the corresponding 95% confidence intervals. The fixed effects included time, code and interactions between code and time. Code comprised two binary coded variables, with the sham group set as the reference group. Each subject was treated as a random effect to account for the correlation in outcomes over time within a subject. For responder analysis, subjects who withdrew after randomization were considered as treatment failures and were included in the denominator. All statistical analyses were conducted by an independent statistician, with blinding of assessors maintained.

Results

From September 2013 to February 2015, 168 patients were screened to enroll 120 patients (Fig. 1). There were no statistically significant differences in baseline data between subjects who were recruited versus not recruited (p>0.05). The two treatment groups appeared homogenous in nature in baseline demographic characteristics and outcome measures (Table 1). Nearly all the subjects completed the study (n=115, 95.8%); with only 5 (4.2%) subjects withdrawing from the study prematurely. The results based on the intention-to-treat analysis were similar to those of the per-protocol analysis.

Primary outcome

Responder analysis (binary data)

Using the primary criterion for response, 45 (75.0%) of 60 subjects in the active group and 13 (21.7%) of 60 subjects in the sham group were treatment responders at the end of the 2 months treatment period (relative risk (RR) 3.46, 95% confidence interval (CI) 2.09-5.72, p<0.001) (Table 2). GLMM analysis with an autoregressive order 1 covariance matrix structure showed a significant difference between treatment groups (p<0.001) (Table 3). The odds ratio of active group being treatment responders were 5.04 (95% CI 2.16-11.78, p<0.001) after one month of treatment and 11.94 (95% CI 6.00-23.76, p<0.001) after two months of treatment, indicating that a longer treatment duration increased the odds of improving in SUI symptoms.

Analysis of continuous outcomes

Patients in the active group showed a significant improvement in ICIQ-UI SF total score from baseline to first month, M_{diff}= -3.53, SE=0.67, p<0.001, 95% CI= [-5.48,-1.58], and from baseline to second month, M_{diff}= -5.72, SE=0.67, p <0.001, 95% CI=[-7.69,-3.75].

Conversely, patients in the sham group showed a non-significant improvement from baseline to first month, M_{diff}= -1.71, SE=0.67, *p*=0.144, 95% CI=[-3.66,0.24], and a significant improvement from baseline to second month, M_{diff}= -2.69, SE=0.67, p=0.001, 95% CI=[-4.64,-0.73]. There were significant differences between the two treatment groups for the ICIQ-UI SF total score (*p*=0.002) (Table 4).

Secondary outcomes

Responder analysis (binary data)

The responder rates of objective and subjective cure, incontinence episode frequency, one-hour pad test, incontinence severity and PGI-I were significantly different between the active and sham group after 4 and 8 weeks of treatment (Table 2). Similarly, GLMM analysis of the secondary outcome measures showed significant differences between treatment groups (p<0.001) (Table 3). A longer treatment duration increased the odds of active group improving in all binary outcome measures except for subjective cure which showed similar odds ratios at both time points.

Analysis of continuous outcomes

The overall impact of UI (ICIQ-UI SF overall impact), incontinence episode frequency, one-hour pad test and overall impact on everyday life (ICIQ-LUTSqol overall impact) showed significant differences between treatment groups over time (Table 4). There were no statistically significant differences between groups over time for pelvic floor muscle function parameters and total score of ICIQ-LUTSqol.

Assessment of blinding

26 (46%) active and 38 (66%) sham patients thought that they received active MS, while 28 (49%) active and 16 (28%) sham patients responded 'don't know' (p=0.06, chi-square test). Assessment of blinding indicated that our blinding technique was successful.

Adverse events and post-void residual

No serious adverse events occurred. Of all evaluable subjects, 3 (5.3%) of 57 subjects in the active group and 5 (8.6%) of 58 subjects in the sham group experienced adverse events (p=0.72, Fisher's exact test). These events included pain at gluteal muscles and hipbone, yellow vaginal discharge (no signs of infection after culture and sensitivity on vaginal swab), constipation, diarrhea, mouth ulcer, delayed menstruation, burning sensation or difficulty in passing urine. No subjects withdrew from the study due to intolerable side effects. All uroflowmetry parameters were not significantly different between the treatment groups (p>0.05).

Discussion

In this study, subjects receiving 16 sessions of active MS were approximately 3.5 times more likely to improve (treatment responder) compared with those in the sham group. This effect was paralleled by the statistically significant differences in the secondary response criteria. Adverse event were infrequent and mild, in agreement with previous studies.[19, 24] The subjective cure rate in the active group was lower than the objective cure rate (31.7% versus 41.7%). It is possible that some patients might be able to consciously control their pelvic floor muscles during the series of provocative movements in the 1-hour pad test but were still unable to react in response to unexpected and abrupt occurrences in their everyday life.

The overall impact on everyday life showed statistically significant differences but not the total ICIQ-LUTSqol score. Our study was not powered to detect the statistical significance although there was a steady decline in the total score in the active group. Additionally, patients can have more control over their bladder symptoms as SUI manifests only under exertion and thus may not affect certain items incorporated in the ICIQ-LUTSqol such as daily household tasks, social life, and ability to travel or to visit friends, unlike the more impairing urgency UI wherein patients cannot predict incontinent episodes.[25, 26]

Likewise, the overall changes of pelvic floor muscle parameters over time were not significantly different. Several reasons could explain this observation. Firstly, the reliability and reproducibility of the perineometer could be questioned. Bo et al. demonstrated that significant differences in recordings were observed depending on positions of probe placement in the vagina.[27] Furthermore, potential bias from intra-observer variability could not be ruled out. We utilized the perineometer due to logistic and cost constraints. More advanced techniques such as real-time diagnostic ultrasonography and magnetic resonance

imaging could be used for more accurate assessments of the pelvic floor muscle function.[28] Next, 16 sessions of MS may be inadequate to significantly strengthen the pelvic floor muscles although patients have started perceiving improvement. Thirdly, our sample size was not powered to detect statistically significant difference despite the progressive trend towards improving pelvic floor muscle function in the active group which was not seen in the sham group. Further studies with a larger sample size may be able to confirm our supposition. Finally, the insignificance could be due to the high variability in pelvic floor muscle measurements resulting in a large standard deviation.

Our study found a cumulative improvement rate of 75% while 42% (objective) and 32% (subjective) of patients were cured. Our findings agree with the pioneer open-label study by Galloway et al. who reported that 34% (defined as using no pads) of patients were cured while 32% (defined as using not more than 1 pad/day; cumulative improvement rate: 66%) of patients improved at 3 months.[19] Most of the previous studies on MS for SUI were open-label studies using varying definitions of 'cure' and 'improvement' and had insufficient sample sizes to assess differences in treatment response, making it difficult to derive meaningful comparisons.[11, 13] We defined improvement as at least 5-point decrease in the total ICIQ-UI SF score based on findings from recent studies.[16, 29]

Our study showed that 8 weeks of active MS resulted in an average decrease (M_{diff}) of 5.72 in the total ICIQ-UI SF score, which proved superior to twelve weeks of PFMT with (M_{diff} = -3.70) or without (M_{diff} = -3.40) biofeedback.[30] Success in PFMT is often hampered by non-adherence, which is related to reasons such as inability to contract pelvic floor muscles, lack of motivation and poor social support.[31] Surgical treatments such as adjustable anchored single incision mini-sling and tension-free vaginal tape-obturator resulted in mean change

±standard deviation of the ICIQ-UI SF score of 10.43±5.95 and 11.65±4.33 respectively, which were superior compared with the success rates reported in our study.[32] This was anticipated, although when given a choice, most patients preferred conservative treatments.[7, 8]

The strengths of our study relate to its design. We included a sham group, calculated an adequate sample size based on our primary outcome measure, included an array of objective and subjective outcome measures, identified the minimum clinically important difference of outcome measures based on literature, provided details of adverse events and followed guideline on reporting of research methodology and outcomes.[33] To our best knowledge, this is the first MS study for SUI which addressed all these critical elements. Additionally, we presented our data taking into account both the responder analysis and analysis of continuous outcome variables. A responder analysis of 'improved' or 'cured' can be perceived intuitively as a more meaningful and relevant information to clinicians and patients to aid in clinical decision-making. Nevertheless, in our effort to minimize information loss through dichotomizing continuous data, we also reported results based on continuous outcome variables, allowing greater precision of efficacy estimates.

Our study had some limitations. While a cross-over study may be more appropriate to examine the true effects of MS, our study opted to conduct a parallel study since it was impossible to blind the subjects once they have experienced the strong contractions of the MS. Our sample size provided limited power for the secondary outcome measures and many desirable subgroup analyses. The intensity of the protocol may have limited enrollment as some subjects may be reluctant to come for treatments frequently. Nevertheless, it was relatively easy to recruit subjects as only 14 (8.3%) of 168 eligible subjects refused to

participate. This may reflect the acceptability of MS compared with physiotherapy or surgery.[6, 34]

Subjects who were non-responder will be given a choice to receive 16 sessions of active MS. In the next phase of our study, our research questions would be to determine the efficacy of active MS in patients who did not respond to the initial sham treatment, and whether a longer treatment duration with active MS will improve treatment response in the initial active group. In the current study, we found that 16 active sessions were more effective than 8 sessions. We intend to further explore if 32 active sessions will yield better results. We strive to assess all subjects for at least 1 year to determine the durability of this treatment, which will be the topic of our upcoming follow-up paper.

In summary, our results showed that subjects in the active MS group were significantly more likely to improve/cure compared with sham treatment. A course of 16 sessions benefited a substantial proportion of patients, yielding results more encouraging than other non-surgical interventions. Our study adds critical information to the currently lacking high-quality evidence on the use of MS for SUI.

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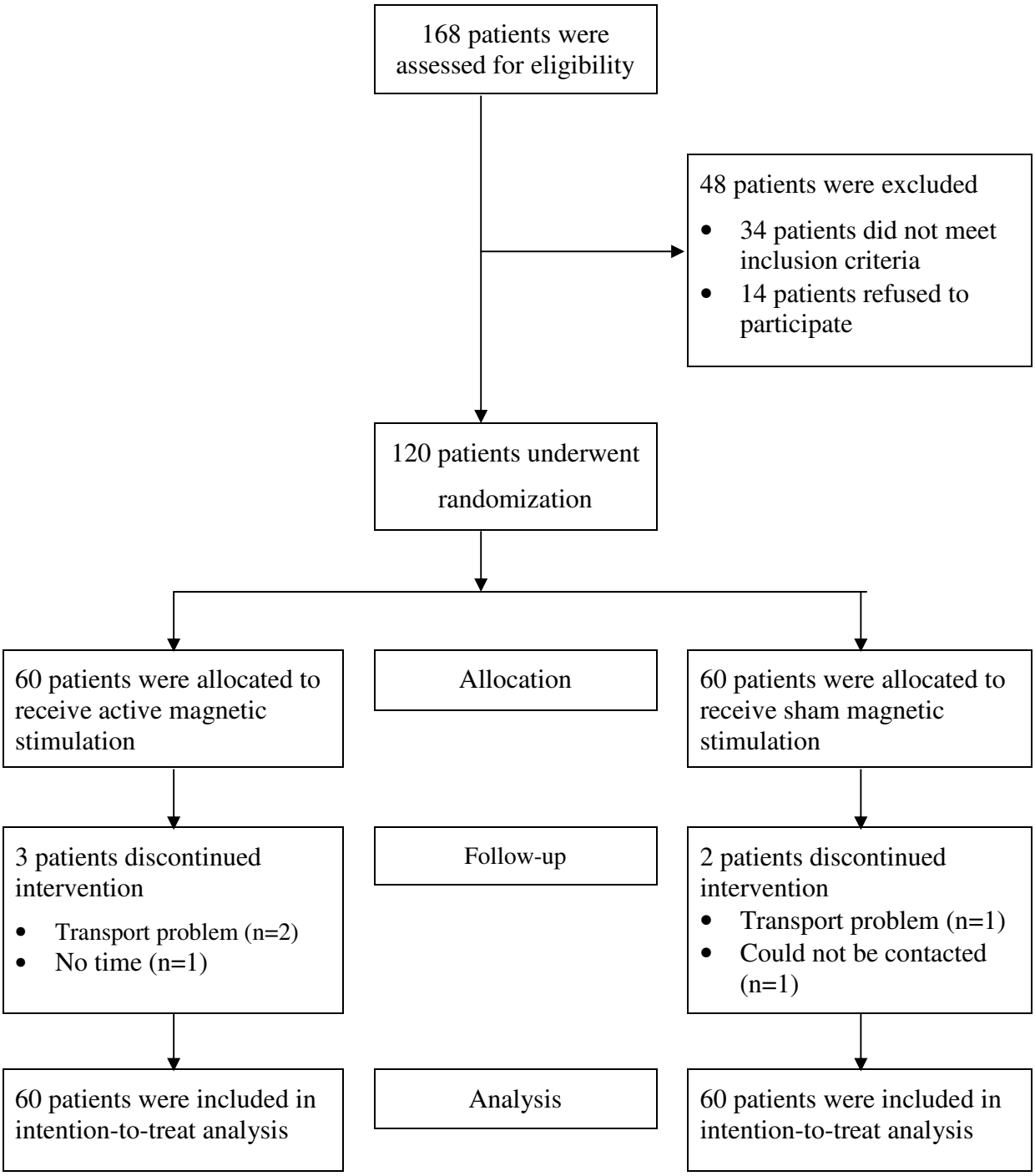

Figure 1. Screening, randomization, treatment and analysis

Table 1. Baseline patient characteristics.*

Characteristic	Active MS (n=60)	Sham MS (n=60)
Age (years)	51.8 ± 10.0	52.7 ± 7.8
Body mass index†	24.8 ± 3.6	26.3 ± 5.3
Duration of symptoms (years)	6.1 ± 6.8	5.4 ± 7.3
POP-Q stage, frequency (%)‡		
0	7 (11.7)	4 (6.7)
1	32 (53.3)	37 (61.7)
2	21 (35.0)	19 (31.7)
Race, frequency (%)		
Chinese	57 (95)	48 (80)
Malay	1 (1.7)	4 (6.7)
Indian	2 (3.3)	8 (13.3)
Postmenopausal, frequency (%)	34 (56.7)	33 (55.0)
Previous hysterectomy, frequency (%)	10 (16.7)	7 (11.7)
Total ICIQ-UI SF score	9.9 ± 3.09	10.1 ± 3.62
Total ICIQ-LUTSqol score	38.55 ± 9.78	39.37 ± 10.83
Incontinence episode frequency (leaks/day)	1.77 ± 1.94	1.35 ± 1.50
1-hour pad test (grams)	11.00 ± 10.78	11.57 ± 12.04
Pelvic floor muscle function		
Maximum contraction (cmH20)	23.98 ± 14.05	26.26 ± 15.45
Average contraction (cmH20)	16.59 ± 9.65	18.85 ± 11.62
Duration of contraction (seconds)	5.88 ± 2.23	6.29 ± 2.53
Uroflowmetry		
Voided volume (ml)	359.95 ± 172.18	388.92 ± 187.48
Maximum flow rate (ml/min)	29.93 ± 10.63	29.14 ± 9.88
Post void residual (ml)	47.57 ± 42.26	40.05 ± 37.62

* Plus–minus values are means ± SD. $p>0.05$ for all comparisons.
† The body mass index is the weight in kilograms divided by the square of the height in meters.
‡ Stages in the Pelvic Organ Prolapse Quantification (POP-Q) system.

Table 2. Responder analysis after 4 and 8 weeks of active or sham magnetic stimulation.

Week	Outcome	Active MS (n=60) Frequency (%)	Sham MS (n=60) Frequency (%)	Relative risk (95% CI)	p-value (chi-square)
4	ICIQ-UI SF*	21 (35.0)	6 (10.0)	3.50 (1.52-8.06)	0.001
	Objective cure†	21 (35.0)	5 (8.3)	4.20 (1.70-10.41)	<0.001
	Subjective cure‡	14 (23.3)	1 (1.7)	14.00 (1.90-103.13)	<0.001
	Incontinence episode frequency§	38 (63.3)	10 (16.7)	3.80 (2.09-6.91)	<0.001
	1-hour pad test¶	36 (60.0)	17 (28.3)	2.12 (1.35-3.33)	<0.001
	Incontinence severity‖	34 (56.7)	21 (35.0)	1.62 (1.08-2.44)	0.017
	PGI-I**	19 (31.7)	4 (6.7)	4.75 (1.72-13.14)	0.001
8	ICIQ-UI SF	45 (75.0)	13 (21.7)	3.46 (2.09-5.72)	<0.001
	Objective cure	25 (41.7)	4 (6.7)	6.25 (2.32-16.87)	<0.001
	Subjective cure	19 (31.7)	3 (5)	6.33 (1.98-20.28)	<0.001
	Incontinence episode frequency	46 (76.7)	12 (20.0)	3.83 (2.27-6.48)	<0.001
	1-hour pad test	49 (81.6)	16 (26.7)	3.06 (1.98-4.74)	<0.001
	Incontinence severity	49 (81.7)	22 (36.7)	2.23 (1.56-3.17)	<0.001
	PGI-I	39 (65.0)	11 (18.3)	3.55 (2.01-6.24)	<0.001

* Responder criterion for ICIQ-UI SF was defined as having a 5-point or greater reduction in the total score compared with baseline.
† Objective cure was defined as a leakage of less than 1 gram on the 1-hour pad test.
‡ Subjective cure was defined as a "never" response to question 3 of the ICIQ-UI-SF, "How often do you leak urine?".
§ Responder criterion for incontinence episode frequency was defined as having at least a 50% reduction in incontinence frequency compared with baseline.
¶ Responder criterion for 1-hour pad test was defined as having a decrease of 50% or more in pad weight compared with baseline.
‖ Responder criterion for incontinence severity was defined as at least one level of improvement in severity groups (e.g., from moderate to mild) compared with baseline. Subjects were divided into the following four categories of SUI severity according to the ICIQ-UI-SF score: slight (1–5), moderate (6–12), severe (13–18) and very severe (19–21).

** Responder criterion for PGI-I was defined as subjects who answered “very much better” and “much better”.

Table 3. Responder analysis using generalized linear mixed model (binary logistic regression) of active or sham magnetic stimulation.

Outcome, frequency (%)	Active MS (n=60)		Sham MS (n=60)		Odds ratio (95% CI) (Week 4)	Odds ratio (95% CI) (Week 8)	p-value (GLMM)
	Week 4	Week 8	Week 4	Week 8			
ICIQ-UI SF	21 (35.0)	45 (75.0)	6 (10.0)	13 (21.7)	5.04 (2.16-11.78)	11.94 (6.00-23.76)	<0.001
Objective cure	21 (35.0)	25 (41.7)	5 (8.3)	4 (6.7)	7.05 (2.90-17.13)	12.94 (4.91-34.16)	<0.001
Subjective cure	14 (23.3)	19 (31.7)	1 (1.7)	3 (5)	7.77 (2.65-22.78)	7.26 (2.67-22.26)	<0.001
Incontinence episode frequency	38 (63.3)	46 (76.7)	10 (16.7)	11 (18.3)	9.53 (5.32-17.05)	16.88 (8.63-33.02)	<0.001
1-hour pad test	36 (60.0)	49 (81.6)	17 (28.3)	16 (26.7)	4.04 (2.11-7.73)	14.44 (6.77-30.81)	<0.001
Incontinence severity	34 (56.7)	49 (81.7)	21 (35.0)	22 (36.7)	2.46 (1.40-4.33)	8.75 (4.29-17.83)	<0.001
PGI-I	19 (31.7)	39 (65.0)	4 (6.7)	11 (18.3)	6.76 (2.35-19.47)	9.04 (4.31-18.97)	<0.001

Table 4. Subjective and objective outcome measures (continuous variables) after 4 and 8 weeks of active or sham magnetic stimulation.

Outcome	Active MS			Sham MS (n=58)			p-value (LMM)
	Baseline (n=60)	Week 4 (n=59)	Week 8 (n=57)	Baseline (n=60)	Week 4 (n=59)	Week 8 (n=58)	
ICIQ-UI SF							
Overall impact of UI	5.02 ± 1.88	3.31 ± 2.58	1.82 ± 1.96	5.00 ± 1.97	3.90 ± 2.30	3.34 ± 2.16	0.041
Total score†	9.93 ± 3.09	6.41 ± 4.18	4.21 ± 3.66	10.12 ± 3.62	8.41 ±3.53	7.43 ± 3.83	0.002
Incontinence episode frequency (leaks/day)	1.77 ± 1.94	0.68 ± 1.13	0.36 ± 0.65	1.35 ± 1.50	1.39 ± 1.22	1.38 ± 1.40	0.049
1-hour pad test (grams)	10.90 ± 10.72	4.81 ± 6.61	2.60 ± 3.46	11.57 ± 12.04	8.95 ± 7.21	8.79 ± 7.72	0.004
Pelvic floor muscle function							
Maximum contraction (cmH20)	23.98 ± 14.05	26.10 ± 11.77	28.76 ± 12.23	26.26 ± 15.45	25.00 ± 14.30	24.91 ± 14.41	0.449
Average contraction (cmH20)	16.59 ± 9.65	18.84 ± 8.85	21.77± 10.14	18.85 ± 11.62	17.25 ± 10.02	18.37 ± 10.81	0.385
Duration of contraction (seconds)	5.88 ± 2.23	7.06 ± 1.99	7.46 ± 1.79	6.29 ± 2.53	6.34 ± 2.41	6.38 ± 2.24	0.143
Uroflowmetry							
Voided volume (ml)	359.95 ± 172.18	NA	385.60 ± 138.51	388.92 ± 187.48	NA	361.14 ± 155.83	0.923
Maximum flow rate (ml/min)	29.93 ± 10.63		32.06 ± 10.91	29.14 ± 9.88		29.07 ± 10.54	0.253
Post void residual (ml)	47.57 ± 42.26		23.86 ± 23.80	40.05 ± 37.62		49.36 ± 38.52	0.094
ICIQ-LUTSqol							
Overall impact	4.95 ± 2.60	3.34 ± 2.29	2.32 ± 2.04	4.95 ± 2.43	4.37 ± 2.55	3.66 ± 2.42	0.032
Total score‡	38.55 ± 9.78	34.75 ± 9.33	29.82 ± 7.48	39.37 ± 10.83	37.78 ± 10.75	34.90 ± 9.85	0.051

NA: Not available

* Plus–minus values are means ± SD.
† The ICIQ-UI SF is a 4-item instrument scored on a scale of 0 to 21 with greater values indicating increased incontinence severity.
‡ The ICIQ-LUTSqol is a 20-item instrument scored on a scale of 19 to 76 with greater values indicating increased impact on quality of life.