

가 2

4

가

(resolve), (im-
 prove), (no change), (worse)
 가
 (success) ,
 (failure)

가 2 cm
가

(anal plug EMG)

12 mm diameter, 45 mm long

PerryMeter anal EMG sensor EPS-21 (PerryMeter Sys-
 tems, Strafford, Pennsylvania, USA)

Kontinence (HMT. Co, Seoul, Korea)

EMG-based biofeedback

. Anal EMG sensor

mean and maximum
 resting, squeeze, and push pressure length of high
 pressure zone, sensory threshold
 anal plug EMG

electrical activity

Descriptive statistics, *t*-test chi-square
 test the Analysis tool
 pak (Microsoft Excel 97, 4.00.950, Microsoft Coopera-
 tion) P value 0.05

¹⁶
(8)

(Biofeedback specialist)가

1 30 60 1

24 16 74

43.8 10.1

(0.5 60)

가

, digitation

4

6 , 4 1

1

2 : 22 (92%) 가
 가 4 , 가 3 , 22 (92%) 가
 가 1 , 3 , 가 1 54%) 22 13 (24
 가 2 1 14 (70%) .
 14 14 3 (20 15%) . 1
 2 .
 transrectal rectocele repair .
 3.6 cm (2 14
 5.6 cm) , 8 (33%),
 16 (67%), 3 (13%), 6
 3 (13%) , .
 2 (8%), (P
 3 (13%) . <0.05) digitation (P<0.05)
 24 가 .
 20 (83%) , , ,
 7.2 (2 17) . (Table 2). mean squeeze
 (P<0.001), (P<0.001) pressure (P<0.001) maximum squeeze pressure (P<
 (P<0.05), (P<0.05), (P<0.05), 0.05)가
 digitation . Mean resting pressure high pressure zone
 (P<0.05), (P<0.005) length
 가 (Table 1), (Table 3).
 (P<0.05)
 가 (Table 1). 가

Table 1. Bowel symptom and bowel movement. Pre- and Post-biofeedback and at follow-up

	Pre-biofeedback (n=24) (%)	Post-biofeedback (n=24) (%)	P-value	Pre-biofeedback (n=20) (%)	At follow up (n=20) (%)	P-value
Difficult defecation	19 (79)	7 (29)	0.001	15 (75)	8 (40)	0.025
Incomplete defecation	23 (96)	11 (46)	0.001	20 (100)	12 (60)	0.002
Laxative use	13 (54)	6 (26)	0.039	11 (55)	6 (30)	0.110
Enema use	5 (21)	0 (0)	0.018	3 (15)	0 (0)	0.072
Anal pain	5 (21)	0 (0)	0.018	3 (15)	1 (5)	0.290
Digitation	5 (21)	1 (4)	0.080	4 (20)	1 (5)	0.150
Bowel movement						
Low frequency	7 (29)	2 (8)	0.064	7 (29)	5 (25)	0.490
Normal frequency	17 (71)	22 (92)	0.064	13 (71)	15 (75)	0.490
Spontaneous bowel movement						
Low frequency	12 (50)	4 (17)	0.014	11 (55)	7 (35)	0.200
Normal frequency	12 (50)	20 (83)	0.014	9 (45)	13 (65)	0.200

Low frequency < 3 times/week, 3 times/week Normal frequency 3 times/day.

Table 2. Predictors of clinical characteristics for biofeedback success at follow-up

Predictors	Success (n=14)	Failure (n=6)	P-value
Age (years)	40.4 ± 18.3	46.7 ± 15.0	NS
Duration of symptoms (years)	11.7 ± 17.4	9.3 ± 7.1	NS
Bowel symptom (%)			
Difficult defecation	86	50	NS*
Incomplete defecation	100	100	NS
Laxative use	57	50	NS
Enema use	14	17	NS
Digitation	7	50	0.028
Anal pain	14	17	NS
Hard stool	50	50	NS
Anal bleeding	29	0	NS
Mucus discharge	7	17	NS
Small caliber stool	29	17	NS
Anal protruding mass	29	0	NS
Abdominal pain	0	33	0.023
Abdominal distension	7	0	NS
Bowel habit change	7	17	NS
Disease & medication history (%)			
Diabetes mellitus	7	0	NS
Hypertension	14	17	NS
Back pain	7	17	NS
Psychotherapeutic drug	14	17	NS
Analgesics	21	17	NS
Antacid	14	17	NS
Operation history (%)			
Anorectal operation	21	17	NS
Abdominal operation	21	33	NS
Gynecologic operation	21	33	NS
Delivery history			
Vaginal delivery history (%)	73	50	NS
Mean number of vaginal delivery	2.45 ± 2.84	0.83 ± 0.98	NS
Others			
Mean number of session of biofeedback	4.86 ± 2.71	4.33 ± 2.88	NS
Finish of treatment by patient (%)	14	33	NS

NS = not significant: Figures ± figures = mean ± standard deviation.

*P = 0.09

(Table 3).

anal plug EMG
 electric activity
 0.71 ± 0.80 mV, 3.18 ± 4.70 mV,
 1.22 ± 1.13 mV electrical ac-
 tivity가 (P <

Table 3. Predictors of anorectal physiologic study for biofeedback success at follow-up

Predictors	Success (n=14)	Failure (n=6)	P-value
Manometry			
Mean resting pressure (mmHg)	45.6 ± 14.8	73.4 ± 22.7	
Maximum resting pressure (mmHg)	52.9 ± 16.8	92.9 ± 38.2	NS
Mean squeeze pressure (mmHg)	48.2 ± 13.3	147.8 ± 19.5	0.001
Maximum squeeze pressure (mmHg)	65.3 ± 26.0	187.8 ± 63.4	0.033
Mean push pressure (mmHg)	47.6 ± 21.0	56.2 ± 27.0	NS
Maximum push pressure (mmHg)	59.5 ± 20.8	49.4 ± 5.7	NS
High pressure zone (cm)	2.7 ± 0.5	3.0 ± 0.0	NS*
Sensory threshold (ml)	29.0 ± 16.8	25.0 ± 21.2	NS
Defecography			
Size of rectocele (cm)	3.4 ± 1.0	3.6 ± 1.0	NS
Non-relaxing puborectalis syndrome (%)	50	17	NS [†]
Descending perineal syndrome (> 5 cm) (%)	57	83	NS
Sigmoidocele (%)	7	17	NS
Anal dyschezia (%)	14	0	NS
Rectal mucosal prolapse (%)	21	0	NS
Colon transit time study			
Colonic inertia (%)	14	0	NS
Electromyography (mV)			
Rest	0.65 ± 0.87	0.73 ± 0.57	NS
Squeeze	2.08 ± 1.60	2.20 ± 0.52	NS
Push	1.00 ± 1.14	1.70 ± 1.13	NS
Change, push-rest	0.35 ± 0.56	0.98 ± 0.61	NS [‡]

NS = not significant; Figures ± figures = Mean ± standard deviation.

*P = 0.08, [†]P = 0.16, [‡]P = 0.13

0.005)

가

electric activity
(Table 3).

가

가

¹⁹⁻²¹,

^{20,21}

가

가

가

가

¹⁷

가

¹⁸

가

가

가

가

가

가

anal plug EMG

electric activity

electrical activity가

(P < 0.005)

가

가 2 cm

,²² 가 2 cm

가

,²³

^{23,24}

Murthy

²⁵ scintigraphy

85%

63%

88%

Sarles²⁶

가 2 cm

가

가

가

²⁷

^{12,28}

79 92%

가

가

^{9,24,25,28,29}

2 cm

, digitation,

가

^{9,24,25,26}

digitation

가

mean squeeze pressure maximum squeeze pressure가 , mean resting pressure, length of high pressure zone가

anismus

long high pressure zone

high rectal

maximum tolerable volume

가

³⁰

가

³¹

가

가

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