Evaluation clinique et instrumentale de la contraction musculaire

Gilberte Robain

Hôpital Rothschild, APHP

UPMC,

Evaluation de la force de contraction musculaire

- Puissance
- Vitesse
- Durée
- Type de contraction : isométrique/dynamique
- Type de contraction : excentrique/ concentrique

Charge maximal et répétition

- Charge de travail : pourcentage de la charge de travail que le sujet peu soulever une fois
- Il existe une relation entre le pourcentage de charge maximale et le nombre de répétition.
- Ainsi un exercice pouvant être répété 3 fois avant la fatigue correspond à 85% de la charge maximale

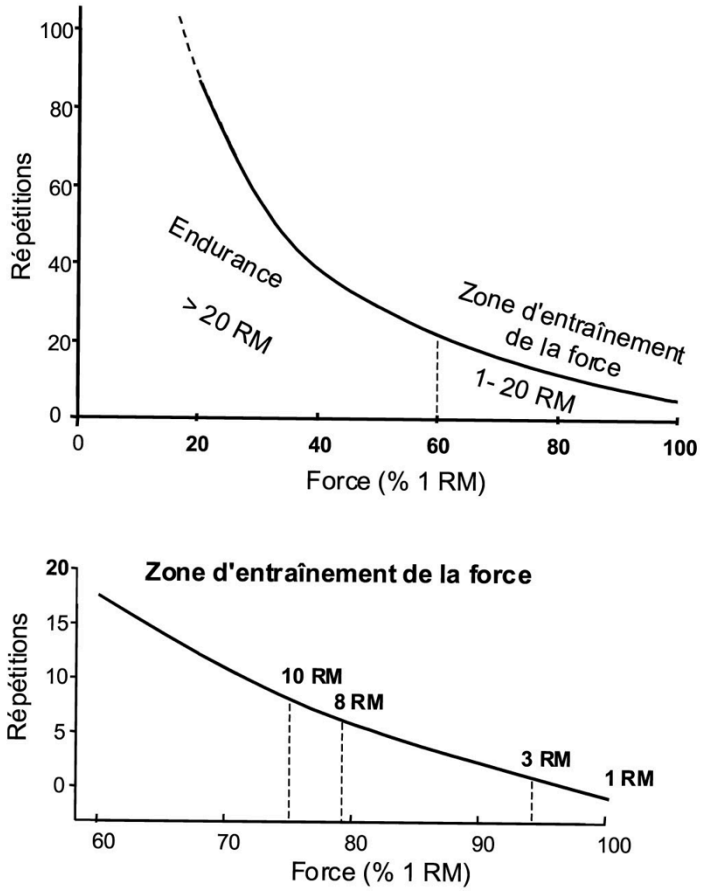


Fig. 1 – (A) Relation entre la force (% 1 RM) et le nombre de répétitions réalisable. La zone de force (1-20 RM) se distingue classiquement de la zone d'endurance (>20 RM). (B) Spécificité de la relation pour la zone d'entraînement de la force (D'après Sale et MacDougall 1981).

Mesure de la force des muscles pelvi-périnéaux

- Les règles qui s'exercent sur le muscle strié ne peuvent s'appliquer simplement RM
- Mesure clinique : testing musculaire
- Mesure instrumentale : pression
- Urodynamique
- EMG
- Radiologique

Int Urogynecol J (2008) 19:131–135
DOI 10.1007/s00192-007-0404-y

ORIGINAL ARTICLE

Evaluation of pelvic floor muscle function in a random group of adult women in Austria

H. Talasz · G. Himmer-Perschak · E. Marth · J. Fischer-Colbrie · E. Hoefner · M. Lechleitner

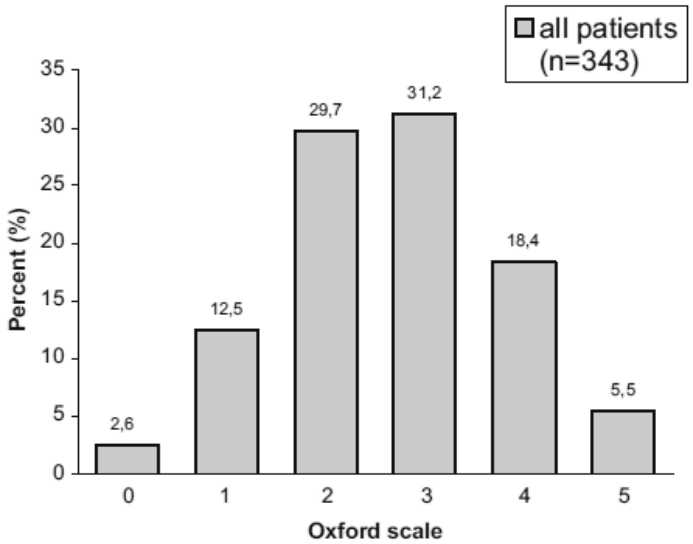


Fig. 1 Pelvic floor muscle function in all patients (n=343) graded by the Oxford Scale

Testing musculaire

Table 2 Graduation of the PFM activity according to the Oxford Grading Scale modified by Laycock

Oxford Grading Scale by Laycock	
0	No muscle activity
1	Minor muscle "flicker"
2	Weak muscle activity without a circular contraction
3	Moderate muscle contraction
4	Good muscle contraction
6	Strong muscle contraction

Laycock J Clinical evaluation of the pelvic floor 1994 Pelvic floor re-education

Testing

Brink Scoring System[20]

Muscle Function Dimension	Score
Squeeze pressure	1=none
	2=weak squeeze, felt as a flick at various points along finger surface; not all the way around
	3=moderate squeeze; felt all the way around finger surface
	4=strong squeeze; full circumference of fingers compressed
Muscle contraction duration	1=none
	2=less than 1 second
	3=greater than 1 second; less than 3 seconds
	4=greater than 3 seconds
Vertical displacement	1=none
	2=finger bases move anteriorly (pushed up by muscle bulk)
	3=whole length of fingers moves anteriorly
	4=whole fingers move anteriorly, are gripped and pulled in
Total	Range=3–12

Brink C Nurs Res 1994 43 352-356

Testing

	Qualité de la contraction	Maintien contraction (s)	Nombre de contractions sans fatigue
0	Aucune contraction	0	0
1	Traces	1s	1
2	Bien perçue sans résistance	< 5s	2
3	Bien perçue sans résistance	> 5s	3
4	Perçue avec légère résistance	> 5s	4
5	Perçue avec forte résistance	> 5s	5

Association de tests

Table 1: The PERFECT assessment scheme

P	Power (pressure)
E	Endurance
R	Repetitions
F	Fast
E	Every
C	Contraction
T	Timed

Cotation d'Oxford de 0 à 5

Laycock 2001, Physiotherapy

Comparaison interexaminateur

Table 5: Analysis of results of digital assessment of ten patients by two examiners (SHD and JL) on the same visit

Patient	*P*		*E*		*R*		*F*	
	SHD	*JL*	*SHD*	*JL*	*SHD*	*JL*	*SHD*	*JL*
1	3.0	2.5	7	6	6	5	7	6
2	4.0	4.0	9	10	3	6	8	7
3	5.0	5.0	10	10	8	6	10	10
4	4.5	4.0	10	10	8	7	10	10
5	2.0	2.0	4	3	3	2	6	5
6	2.0	3.0	3	2	4	5	5	6
7	3.0	3.0	3	3	6	5	5	6
8	1.0	1.0	2	2	1	2	3	2
9	1.5	1.0	4	5	3	3	4	5
10	4.0	4.0	3	3	4	5	7	7
Spearman's correlation	r = 0.947		r = 0.946		r = 0.730		r = 0.909	
Coefficient significance level	p < 0.001		p < 0.001		p < 0.005		p < 0.001	

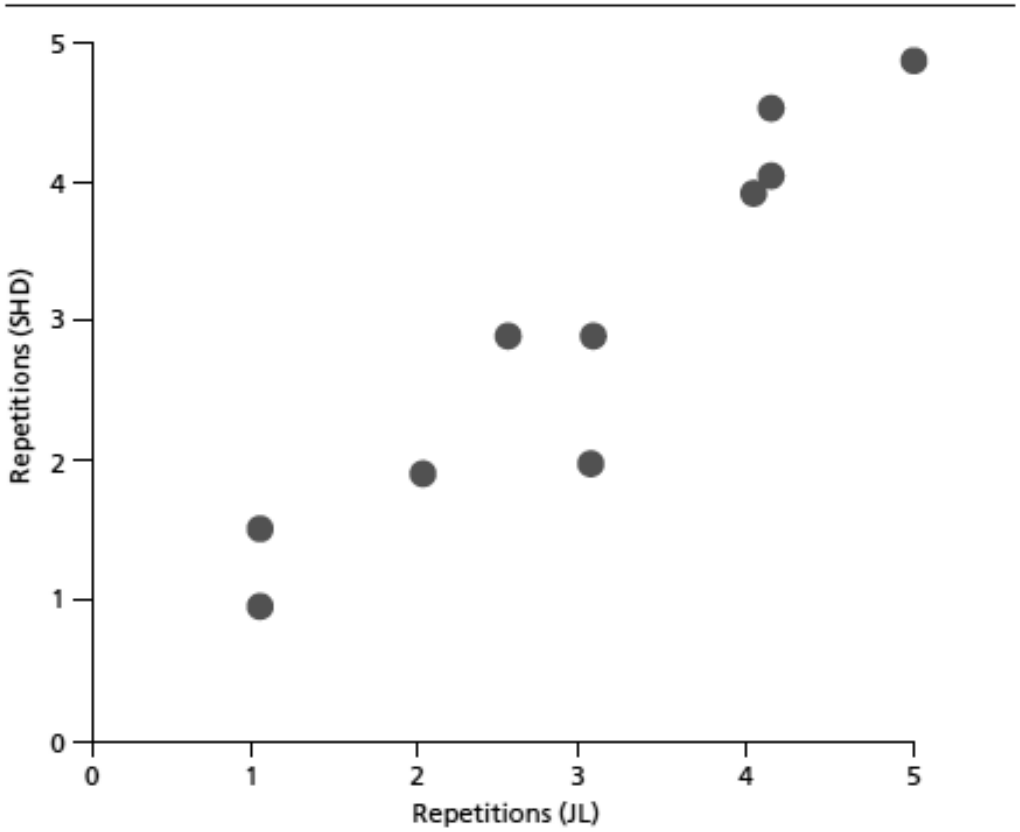


Fig 1: Pressure of PFM contractions assessed by JL and SHD with line of equality

Table 6: Test-retest results of digital assessment of power (P) and endurance (E)

Patient	*Power*		*Endurance*	
	Test 1	*Test 2*	*Test 1*	*Test 2*
1	*3.0*	*4.0*	*2*	*2*
2	0.0	0.0	0	0
3	3.0	3.0	3	3
4	4.0	3.5	10	10
5	3.0	3.5	5	6
6	3.5	4.0	10	10
7	2.5	2.0	5	6
8	2.0	2.0	2	3
9	0.0	0.0	0	0
10	3.0	3.5	7	7
11	2.5	2.5	4	4
12	2.5	3.0	2	3
13	4.0	4.5	8	9
14	4.0	4.0	10	10
15	4.5	4.0	4	6
16	2.5	2.5	8	8
17	2.0	2.0	10	10
18	3.0	3.5	10	10
19	5.0	5.0	5	5
20	3.5	4.0	10	10
Spearman's correlation	r = 0.929		r = 0.988	
Coefficient significance level	p < 0.001		p < 0.001	

Bonne reproductibilité avec une courbe d’apprentissage

Reproducibility of vaginal palpation

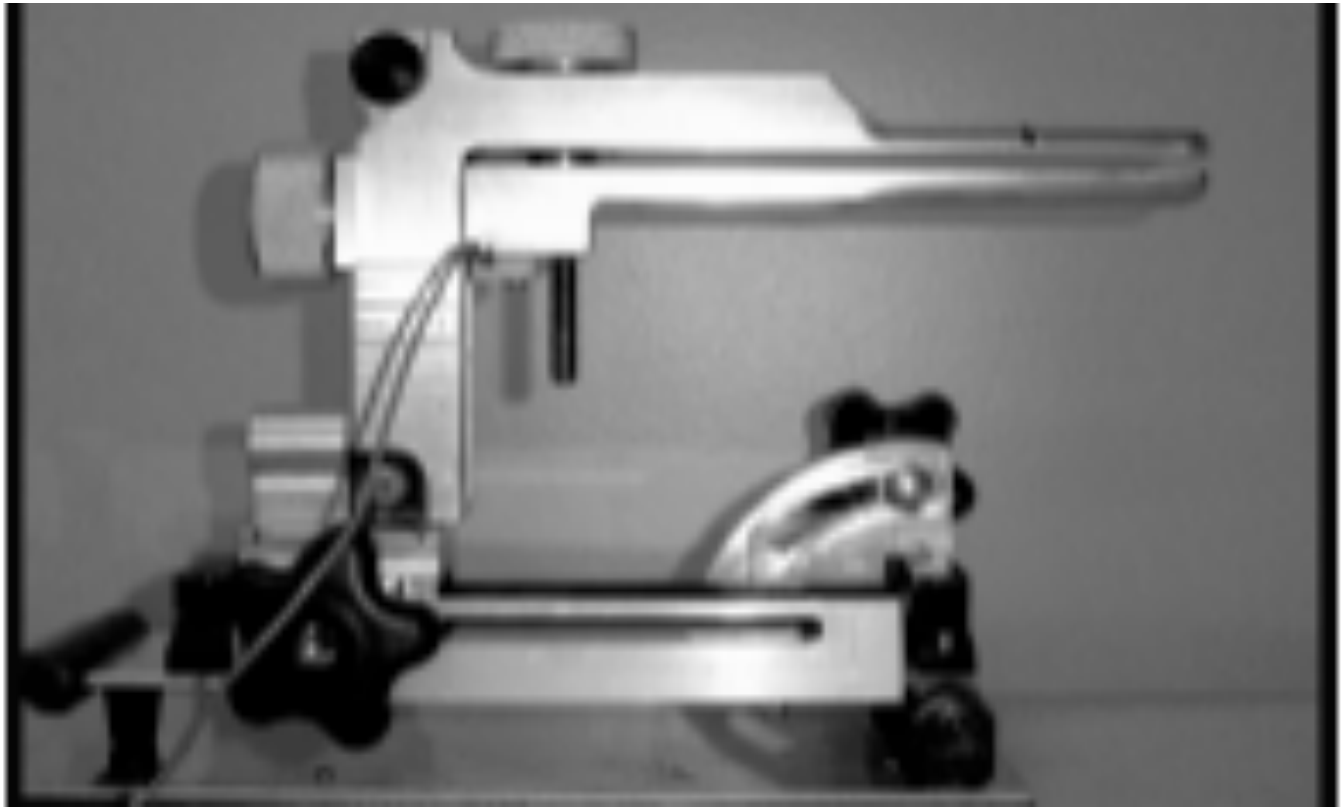
Coefficient pour le toucher vaginal
Inter-rater reliability 0.7
Cohen's Kappa 0.37

Table I. Results of the two vaginal palpation tests between two physical therapists. Muscle strength classified by the modified Oxford grading system (0–5)

Subject	Physical therapist 1	Physical therapist 2
1	3	4
2	4	4
3	3	4
4	4	5
5	4	4
6	2	3
7	2	2
8	4	3
9	3	4
10	4	4
11	3	3
12	2	2
13	2	3
14	2	2
15	4	5
16	4	4
17	2	3
18	2	4
19	3	3
20	2	3

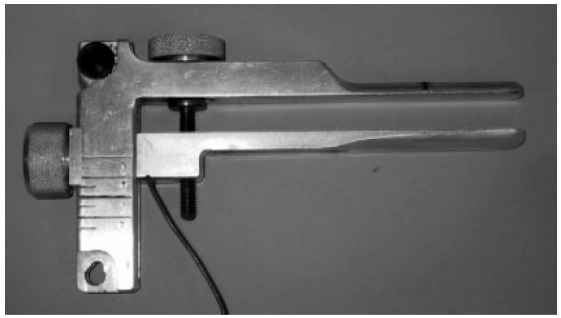
Bo, 2001 acta obste scand

Périnéometre



Valeurs dépendant en partie de la taille du vagin

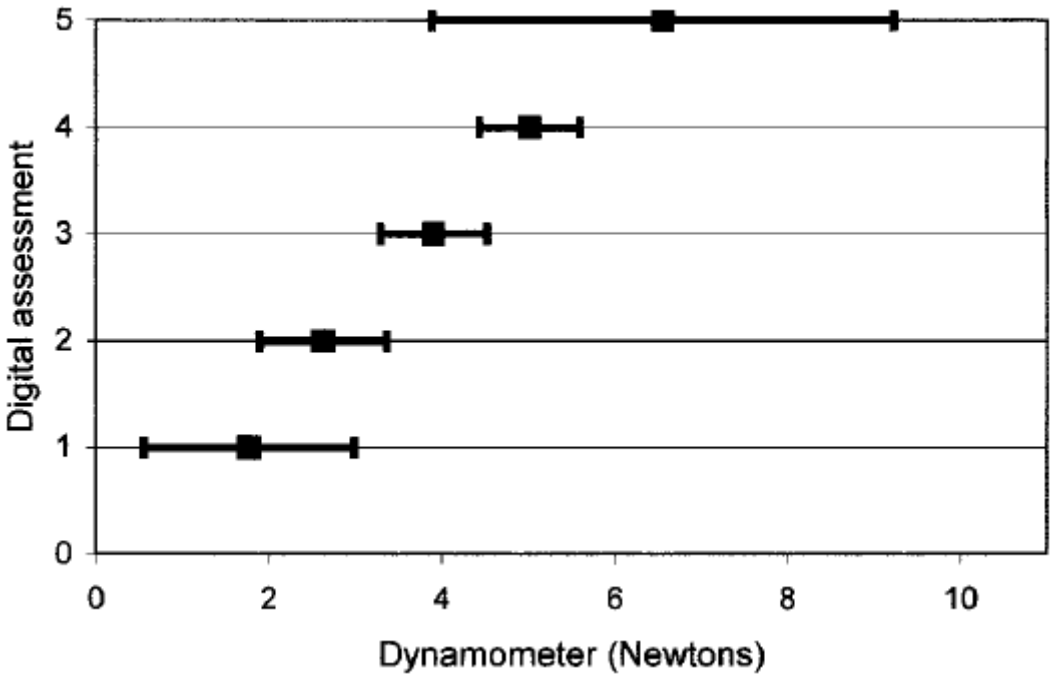
Grade	Description
0	Nil
1	Flicker
2	Weak
3	Moderate, slight lift of the examiner's fingers, no resistance
4	Good, sufficient to elevate the examiner's fingers against light resistance
5	Strong, sufficient to elevate the examiner's fingers against strong resistance



Neurourology and Urodynamics 23:336–341 (2004)

Pelvic Floor Maximal Strength Using Vaginal Digital Assessment Compared to Dynamometric Measurements

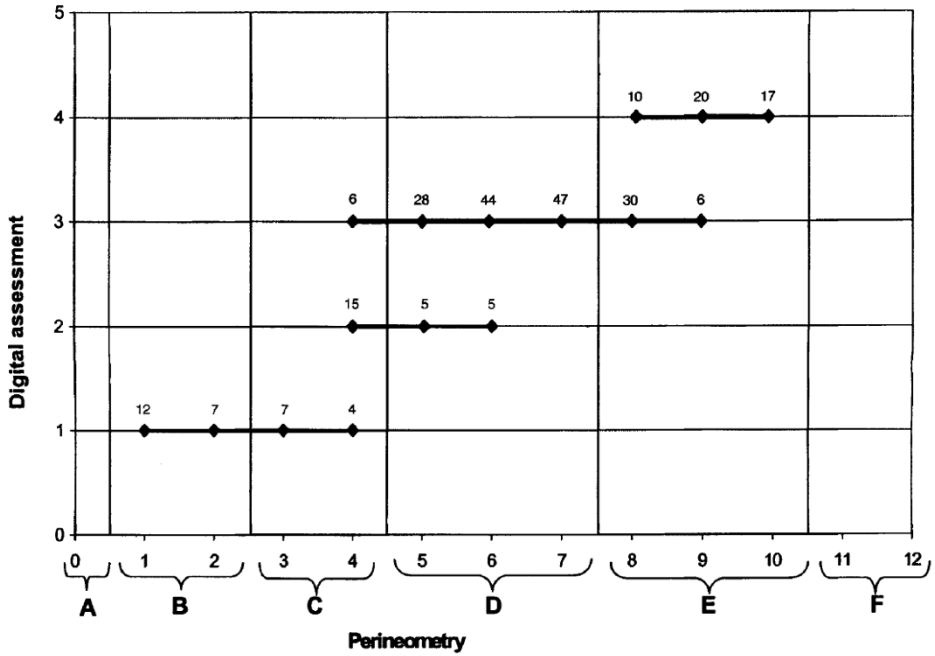
M. Morin,* C. Dumoulin, D. Bourbonnais, D. Gravel, and M.-C. Lemieux
School of Rehabilitation, Faculty of Medicine, University of Montreal, Montreal, Canada



British Journal of Obstetrics and Gynaecology
August 2000, Vol 107, pp. 1007–1011

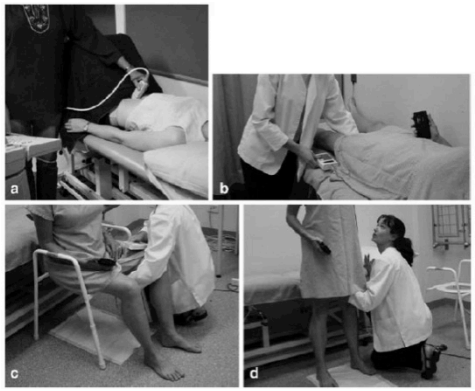
Comparative assessment of pelvic floor strength using a perineometer and digital examination

P. J. Isherwood *Senior Registrar*, **A. Rane** *Consultant*
Department of Urogynaecology, Kirwan Hospital for Women, Townsville, Queensland, Australia



Testing périnéal

Effet de la position ?



Score plus élevé en position allongée

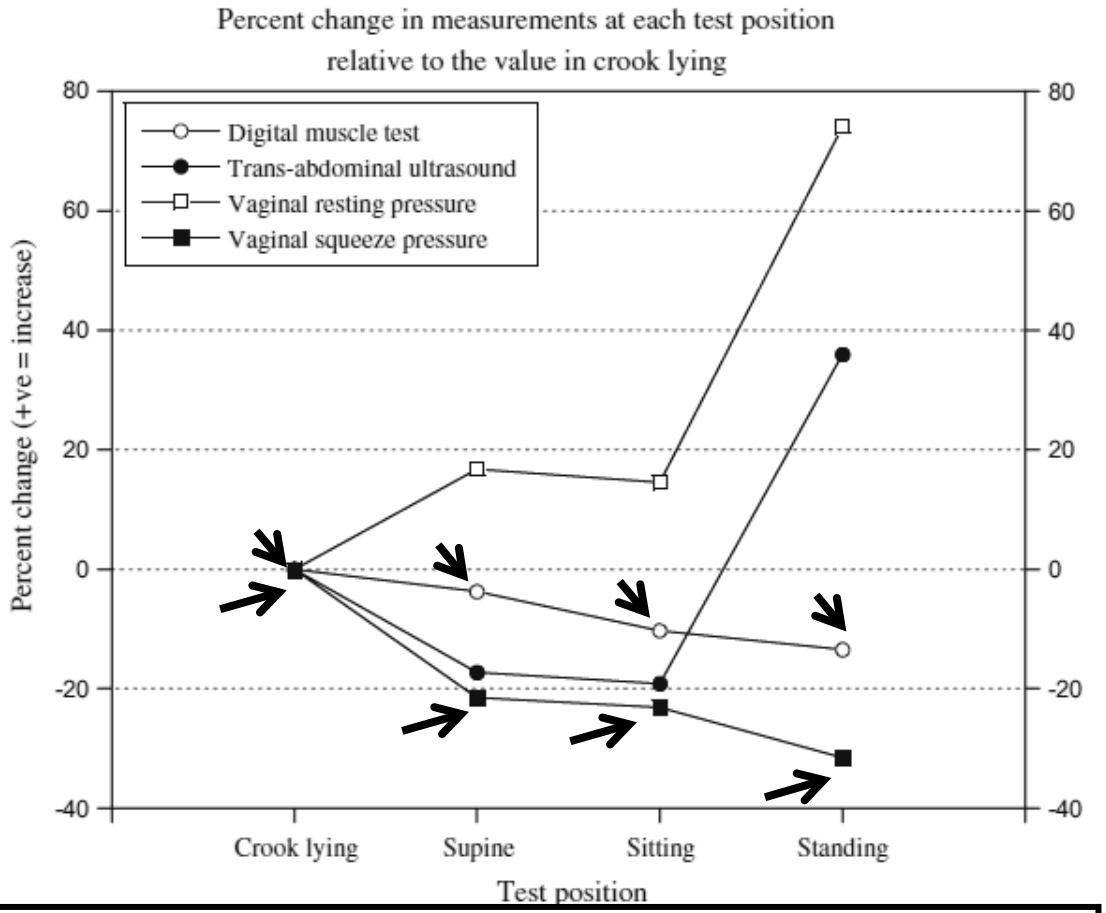
(testing manuel et manométrie)

Int Urogynecol J (2006) 17: 365–371
DOI 10.1007/s00192-005-0016-3

ORIGINAL ARTICLE

Helena C. Frawley · Mary P. Galea · Bev A. Phillips · Margaret Sherburn · Kari Bø

Effect of test position on pelvic floor muscle assessment



Et…meilleure reproductibilité en position assise, puis debout, puis allongée

Brink scale

Pelvic-floor muscle assessment
Pressure
1—no response, cannot perceive
2—weak squeeze, felt as a flick
3—moderate squeeze, felt all around finger
4—strong squeeze, full fingers compressed
Pelvic contraction assessment (duration)
None
≥1 and ≤3 seconds
>3 seconds
Displacement of vertical plane
1—none
2—fingertips may move anteriorly
3—whole length of fingers move anteriorly
4—whole fingers move anteriorly

Score de 3 à 12 points

FitzGerald Physical therapy 2007

Score en fonction de la pathologie

Table 2.
Descriptive Statistics for Continuous Measures (N=643)[a]

Variable	n	Mean	SD	Minimum Value	Median Value	Maximum Value
Age	643	51.9	10.3	27	50	81
No. of pregnancies	643	3.3	1.7	0	3	12
No. of vaginal deliveries	643	2.6	1.6	0	2	10
Genital hiatus (cm)	641	3.6	1.2	1	3.5	10
Brink scale total score	643	9.0	2.1	3	9	12
MESA total score	643	25.8	7.4	4	26	43
MESA stress incontinence subscale score	643	19.3	4.6	4	20	27
MESA urge incontinence subscale score	643	6.5	3.9	0	6	17
UDI total score	639	151.1	49.0	0	150.5	290.9
UDI obstructive symptoms subscale score	640	25.2	21.8	0	18.2	97.0
UDI irritative symptoms subscale score	640	47.8	25.3	0	50	100
UDI stress symptoms subscale score	639	78.0	22.0	0	83.3	100
Pad test weight (g)	633	43.6	79.8	0.1	15.1	1,022.6
Diary: average leaks/day	642	3.2	3.0	0	2.3	26

[a] MESA=Medical, Epidemiological, and Social Aspects of Aging urinary incontinence questionnaire; UDI=Urogenital Distress Inventory.

Gain de pression et testing

Tableau 2 Moyennes des paramètres cliniques et urodynamiques en fonction de la contraction des muscles du plancher pelvien (MPP) ($n = 358$).

Paramètres	Contraction des muscles du plancher pelvien				Test de la valeur de *p*
	Absente	Faible	Normale	Forte	
Effectif (%)	18 (5,02)	52 (14,53)	169 (47,21)	119 (33,24)	–
Score ICIQ-SF (0 à 21)	14 ± 4	12 ± 5	12 ± 4	12 ± 5	NS
Âge (année)	55 ± 13	56 ± 17	54 ± 13	52 ±11	NS
IMC (kg/m^2)	28 ± 4	26 ± 6	26 ± 5	25 ± 6	NS
Parité	2 ± 3	2 ± 1	2 ± 1	2 ± 1	NS
Hystérectomie (%)	4 (22,22)	11 (21,15)	26 (15,38)	11 (9,24)	NS[a]
Point Aa (−3 à 0 cm)	−1,36 ± 0,70	−1,55 ± 0,66	−1,45 ± 0,71	−1,46 ± 0,73	NS[a]
PCUM de repos (cmH_2O)	48,72 ± 18,33	48,48 ± 23,03	47,84 ± 23,82	49,32 ± 21,99	NS
LUF (mm)	26,11 ± 7,29	25,27 ± 5,22	26,17 ± 5,83	26,45 ± 4,80	NS
PCUM en retenue (cmH_2O)	57,06 ± 18,36	67,5 ± 27,52	69,92 ± 27,33	88,73 ± 31,86	< 0,0001
Gain de PCUM (cmH_2O)	8,33 ± 6,31	19,02 ± 13,26	22,08 ± 12,23	39,41 ± 27,35	< 0,0001
VLPP + (cmH_2O)	41,22 ± 21,73	53,8 ± 21,35	53,45 ± 21,10	53,38 ± 23,98	NS

PCUM : pression de clôture urétrale maximale ; LUF : longueur urétrale fonctionnelle ; VLPP : Valsalva Leak Point Pressure.
[a] Tests non paramétriques de Kendall et de Komorov-Smirnov.

Dompeyre, 2014n progrés en urologie

Int Urogynecol J (2010) 21:1137–1142
DOI 10.1007/s00192-010-1150-0

ORIGINAL ARTICLE

Effects of age on levator function and morphometry of the levator hiatus in women with pelvic floor disorders

Mirjam Weemhoff · Ka Lai Shek · Hans P. Dietz

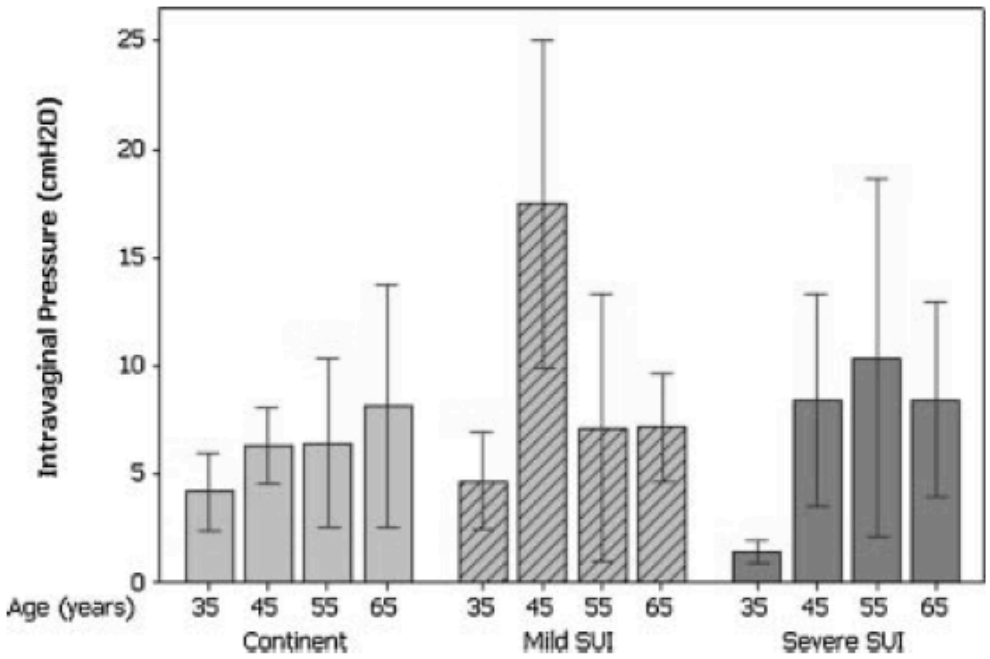
Table 2 Effect on pelvic floor muscle strength by mean modified Oxford grading

	Standardised *b*	*p* value
Simple linear regression analysis		
Age	−0.25	<0.01
Menopausal status	0.03	0.52
At least one vaginal delivery	−0.17	<0.01
Levator defect (avulsion)	−0.29	<0.01
Multiple linear regression analysis		
Model: Age, at least 1 vaginal delivery, levator defects (avulsion)		
Age	−0.21	<0.01
At least 1 vaginal delivery	−0.11	0.04
Levator defect (avulsion)	−0.25	<0.01

Neurourology and Urodynamics 29:437–442 (2010)

Intravaginal Pressure Generated During Voluntary Pelvic Floor Muscle Contractions and During Coughing: The Effect of Age and Continence Status

Stéphanie J. Madill and Linda McLean*
School of Rehabilitation Therapy, Queen's University, Kingston, Ontario, Canada



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Levator defect (avulsion)	−0.25	<0.01

Int Urogynecol J (2009) 20:1497–1504
DOI 10.1007/s00192-009-0978-7

ORIGINAL ARTICLE

Pelvic floor muscle function in a general female population in relation with age and parity and the relation between voluntary and involuntary contractions of the pelvic floor musculature

Marijke C. Ph. Slieker-ten Hove · Annelies L. Pool-Goudzwaard · Marinus J. C. Eijkemans · Regine P. M. Steegers-Theunissen · Curt W. Burger · Mark E. Vierhout

Table 3 Pelvic floor muscle function (PFMF) versus parity in percentages (individual PFM items with yes/no scores or three category scores), ten were missing data on parity in the questionnaire

		0 (*n*=49)	1 (*n*=86)	2 (*n*=321)	≥3 (*n*=183)	Total (*n*)	*p* value
Voluntary contraction	Absent	2	8.1	5.3	4.9	5.3 (34)	.427
	Weak	20.4	30.2	32.2	32.8	31.2 (199)	
	Normal	73.5	59.3	56.6	57.4	58.5 (373)	
	Strong	4.1	2.3	5.9	4.9	5 (32)	
Endurance	0–10 s	6.26	7.31	6.07	6.10	6.37 (3.23)	.103

Int Urogynecol J (2010) 21:311–319
DOI 10.1007/s00192-009-1037-0

ORIGINAL ARTICLE

Pelvic floor muscle function in a general population of women with and without pelvic organ prolapse

Marijke Slieker-ten Hove · Annelies Pool-Goudzwaard · Marinus Eijkemans · Regine Steegers-Theunissen · Curt Burger · Mark Vierhout

Table 4 Association between pelvic floor muscle function and pelvic organ prolapse, measured with the POPQ

Outcome		PFMF versus vaginal examination					
		Stage 0 $n=161$	Stage 1 $n=235$	Stage 2 $n=212$	Stage 3 $n=32$	Stage 4 $n=3$	p value[a]
Maximum voluntary contraction	Absent	8 (5)	14 (6.0)	12 (5.7)	0	0	0.280
	Weak	53 (32.9)	61 (26)	75 (35.5)	12 (37.5)	2 (66.7)	
	Normal	91 (56.5)	145 (61.7)	117 (55.5)	20 (62.5)	1 (33.3)	
	Strong	9 (5.6)	15 (6.4)	7 (3.3)	0	0	
		$n=161$	$n=234$	$n=212$	$n=32$	$n=3$	
Mean endurance in seconds	0–10 s	6.51 (SD 3.2)	6.35 (SD 3.39)	5.93 (SD 3.25)	6.28 (SD 3.15)	4.00 (SD 1.00)	0.332

Int Urogynecol J (2010) 21:311–319
DOI 10.1007/s00192-009-1037-0

ORIGINAL ARTICLE

Pelvic floor muscle function in a general population of women with and without pelvic organ prolapse

BJOG 2009;116:1706–1714.

Marijke Slieker-ten Hove · Annelies Pool-Goudzwaard · Marinus Eijkemans · Regine Steegers-Theunissen · Curt Burger · Mark Vierhout

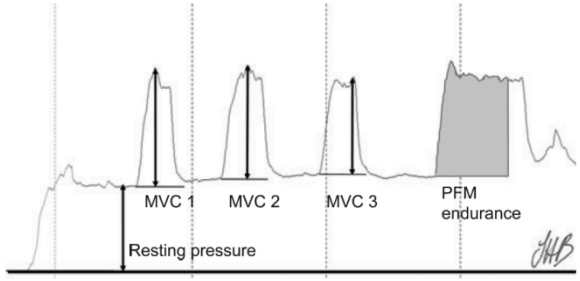

Table 1. Odds ratios of factors associated with pelvic organ prolapse using conditional multiple regressions

	n	Adjusted OR (95% CI)	*P* value
PFM strength (cmH_2O)			0.013***
Strong (>40)	33	Reference	
Medium (20–40)	33	3.5 (0.8–15.6)	0.096
Weak (<20)	32	7.5 (1.5–36.4)	0.013
OR per SD (22.5) decrease	98	1.07 (1.01–1.13)	0.028
PFM endurance (cmH_2O seconds)			0.006***
Good (>300)	32	Reference	
Medium (130–300)	35	2.8 (0.7–12.1)	0.167
Poor (<130)	31	11.5 (2.0–66.9)	0.006
OR per SD(193) decrease	98	2.27 (1.19–4.33)	0.013

Imagerie

- Taille et volume du muscle
- Efficacité de la contraction sur les modifications de rapports anatomiques
- Possibilité d'action du muscle (désinsertion)
- Ne donne pas la force

Efficacité de la rééducation et modifications morphologiques du *levator ani*

Morphological Changes After Pelvic Floor Muscle Training Measured by 3-Dimensional Ultrasonography

A Randomized Controlled Trial

Ingeborg Hoff Brækken, MSc, PT, Memona Majida, Marie Ellström Engh, PhD, and Kari Bø, PhD, PT

VOL. 115, NO. 2, PART 1, FEBRUARY 2010

OBSTETRICS & GYNECOLOGY

	Pelvic Floor Muscle Training Group (n=59)		
	Pretest	Posttest	*P*
Morphology			
Muscle thickness (mm)	9.0 (8.5–9.6) [58]	10.5 (9.8–11.1) [56]	<.001 [56]
Levator hiatus area at rest (cm^2)	23.7 (22.4–25.1) [59]	22.2 (20.9–23.4) [58]	.002 [58]
Muscle length at rest (mm)	121.2 (117.0–125.5) [55]	117.2 (112.7–121.7) [56]	.001 [54]
Function			
Levator hiatus area maximum Valsalva (cm^2)	29.5 (26.5–32.4) [37]	28.9 (26.3–31.4) [50]	.004 [36]
Muscle length at Valsalva (mm)	142.3 (132.8–151.9) [37]	140.0 (132.8–147.2) [50]	.001 [36]

EMG

- Activité musculaire
- Recrutement des fibres
- Endurance

Au total

- Testing le plus simple
- Assez reproductible avec courbe d'apprentissage
- Moyen sur les valeurs intermédiaires
- Perinéomètre
- Valeur absolue
- Même problématique