

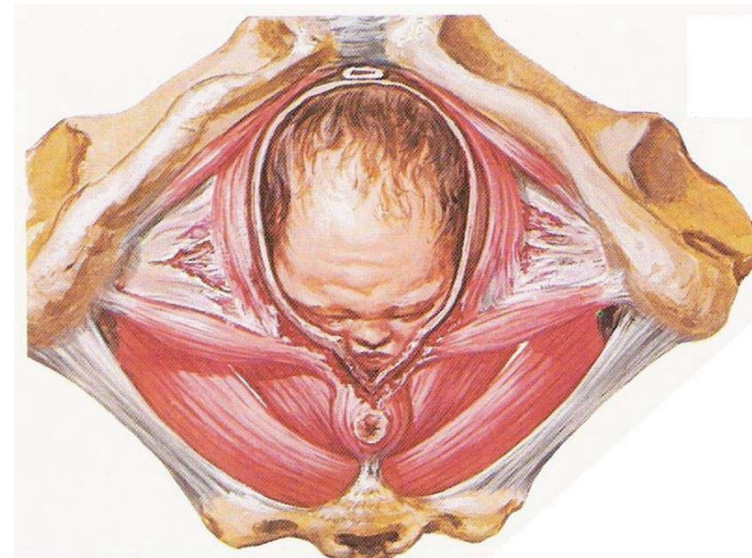
Obstetric Anal Sphincter Injury (OASI): Anatomy, Physiology, Epidemiology

Shimon Ginath, MD

The Israeli Society
of Urogynecology
and Pelvic Floor



החברה הישראלית
לאורוגינקולוגיה
ורצפת האגן



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פקסימיליה: 0

We are not pigs...



but we know them very well...



For all your research needs

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2 מרכזים רפואיים

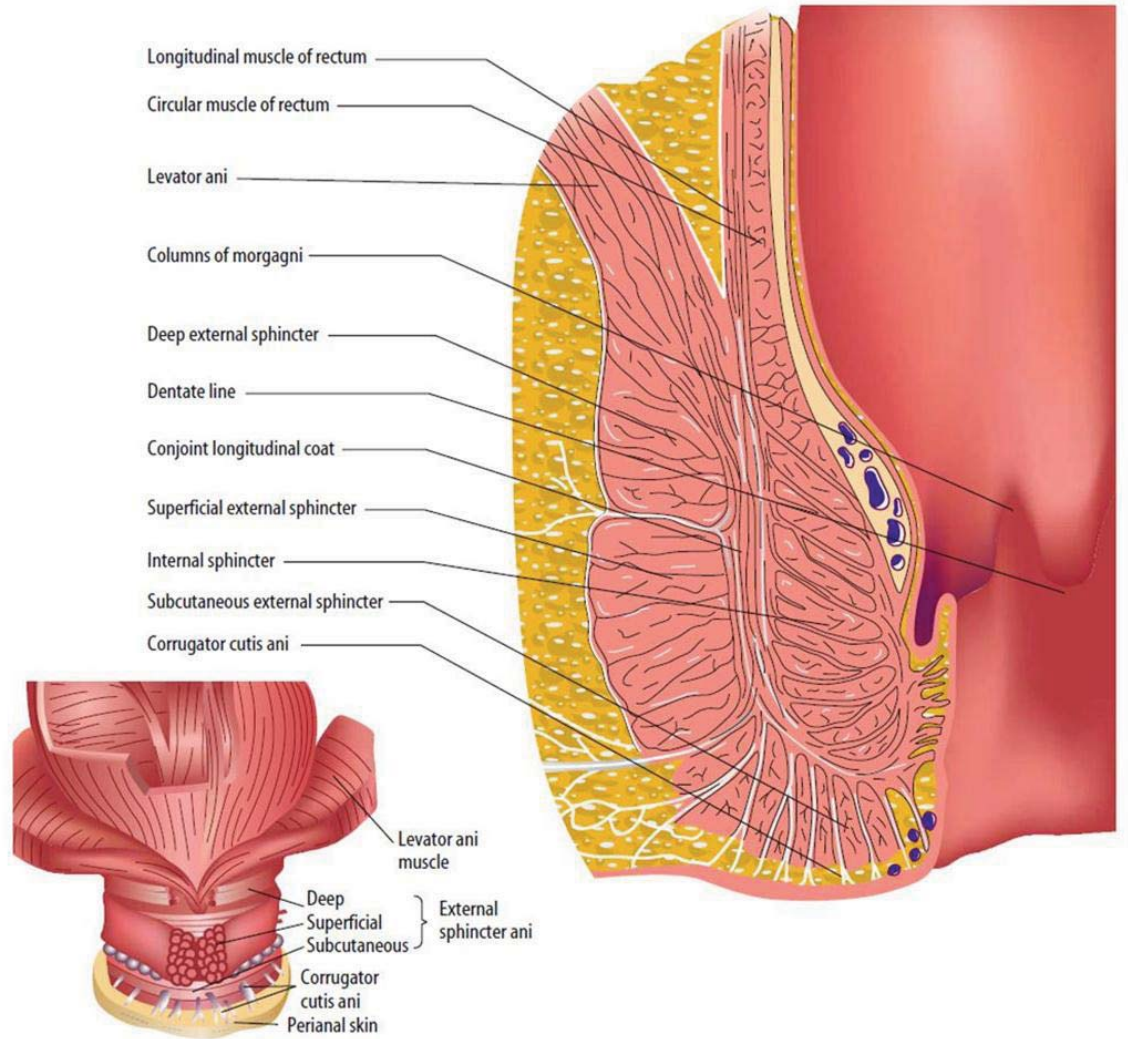
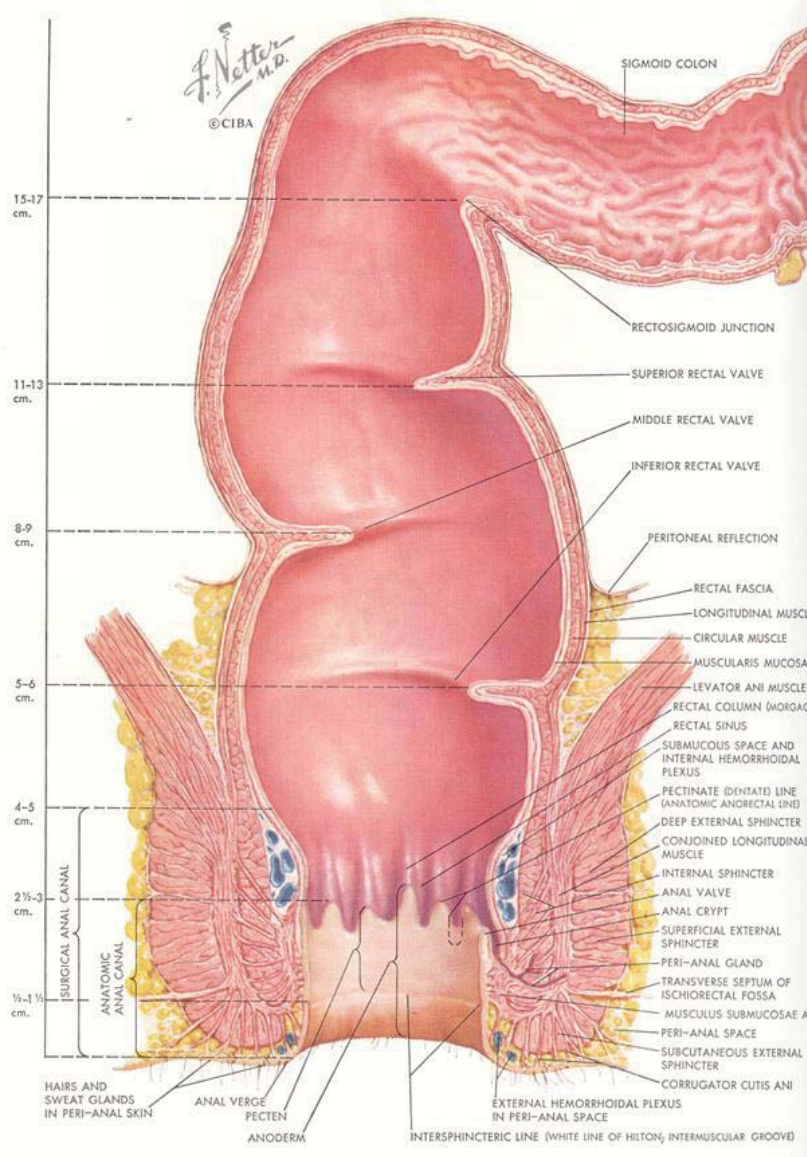
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26/7/2012	1. הלליפה	10/2/2011	2. מעיני ישועה
		1	
21/9/2012	1. שערי צדק	7/7/2011	3. רבקה זיו
18/10/201	1. כרמל	15/9/201	4. וולפסון
2		1	
20/12/201	1. מאיר	3/11/201	5. אסף הרופא
2		1	
24/1/2013	1. קפלן	15/12/20	6. שיבא
		11	
7/2/2013	1. לניאדו	26/1/201	7. ליס
		2	
5/4/2013	1. העמק	2/3/2012	8. פורייה
1/5/2013	2. לימודי המשך (אונת א)	30/3/201	9. דבין

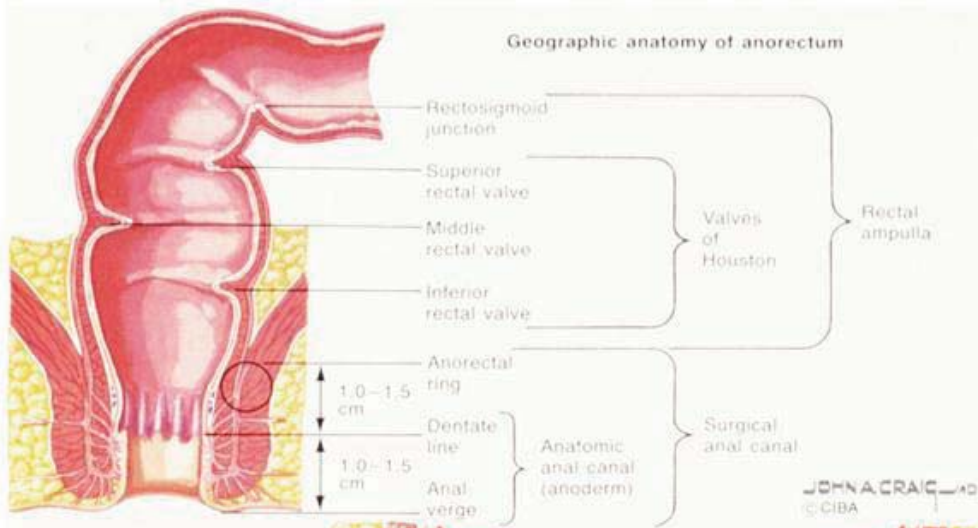


Anatomy of the Rectum & Anal Canal

- The anal canal measures ~3.5 cm in length
- External anal sphincter (EAS):
 - Striated muscle: Subcutaneous, Superficial, Deep
 - Contributes ~30% of the resting pressure
 - Responsible for voluntary squeeze and reflex contraction pressure (\uparrow IAP)
 - Innervated by pudendal nerve
 - Damage \rightarrow urge fecal incontinence
- Internal anal sphincter (IAS):
 - Smooth muscle: thickened continuation of the circular bowel muscle
 - Contributes ~70% of the resting pressure
 - Under autonomic control
 - Damage \rightarrow passive soiling and flatus incontinence







Anorectal anatomy

Longitudinal muscle of rectum

Circular muscle of rectum

Muscularis mucosae

Mucosa

Puborectalis muscle

Rectal columns

Anorectal ring

Internal hemorrhoidal plexus

Deep external sphincter

Intersphincteric plane

Internal sphincter

Anal crypt

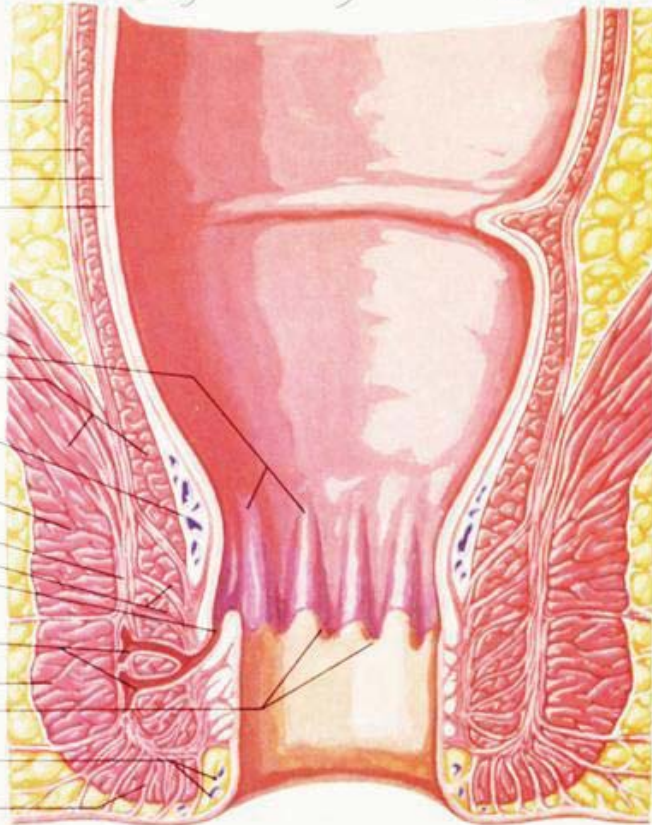
Anal gland (lies in intersphincteric plane, opens into crypt)

Superficial external sphincter

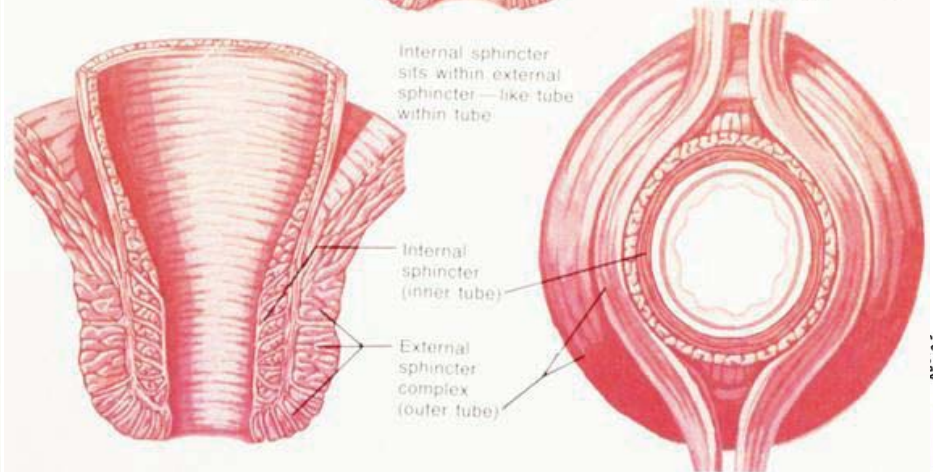
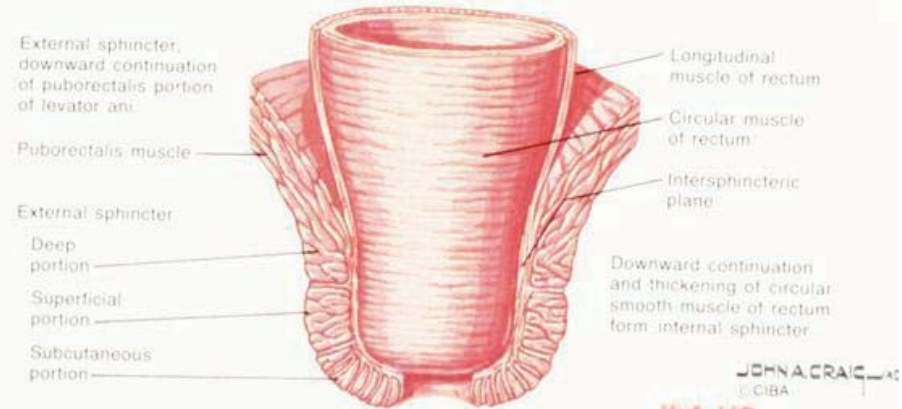
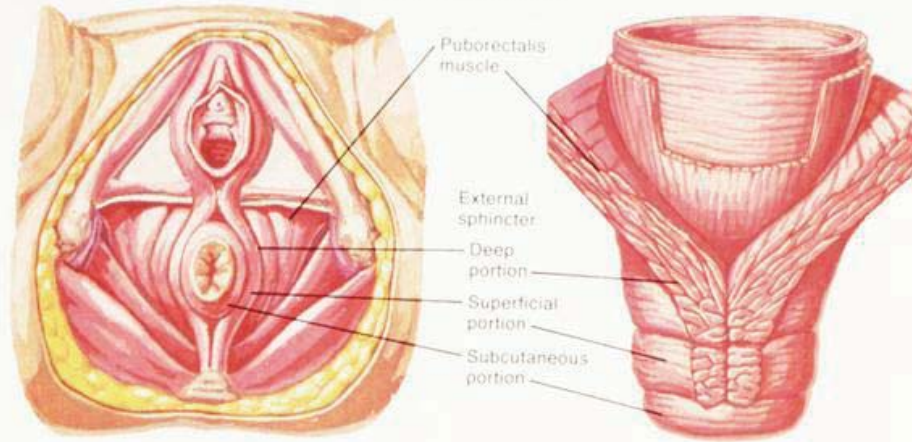
Dentate line

External hemorrhoidal plexus

Subcutaneous external sphincter



Anal Musculature



Longitudinal smooth muscle

Rectum

Circular smooth muscle

3a

3b

3c

4

Fat

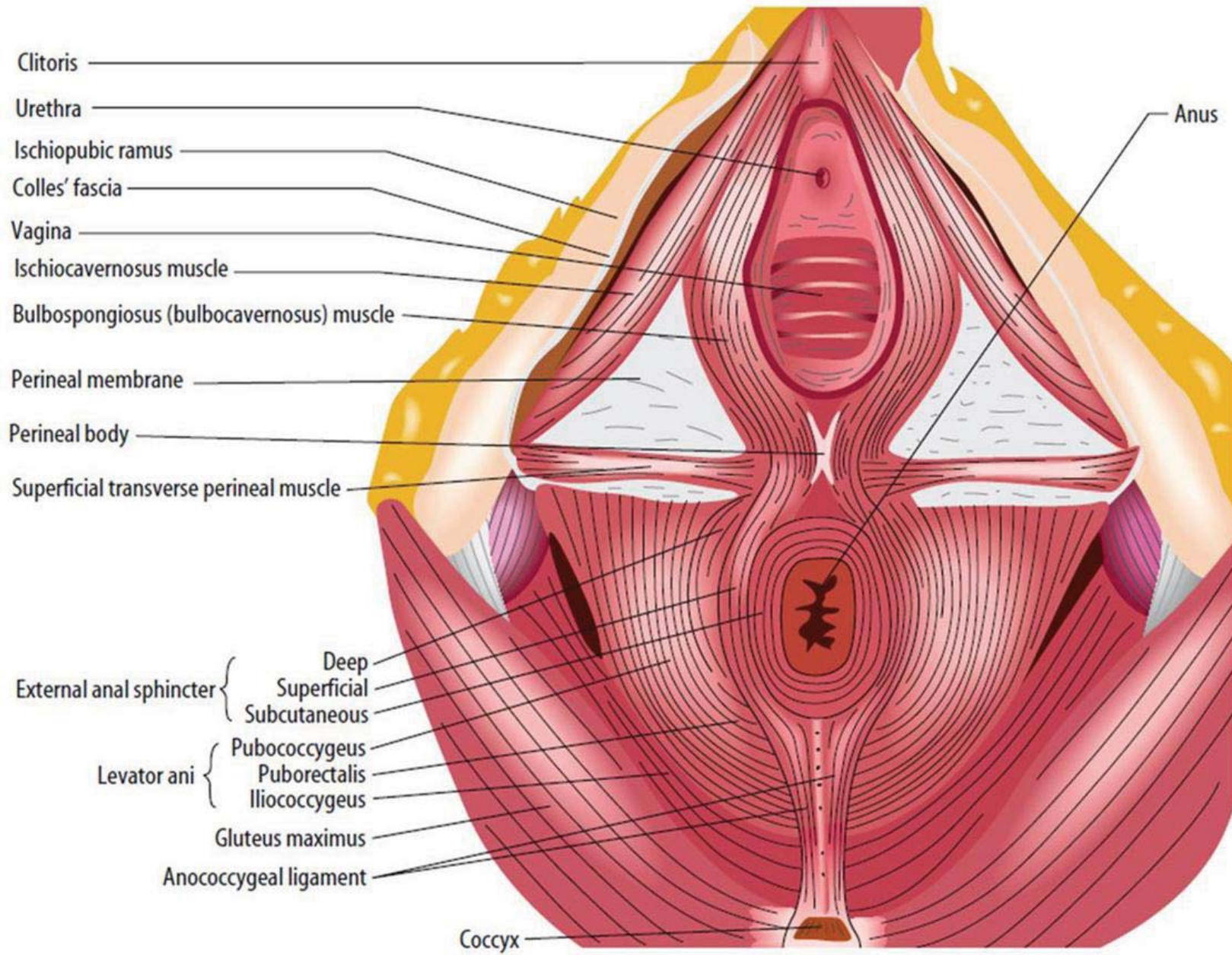
Anus

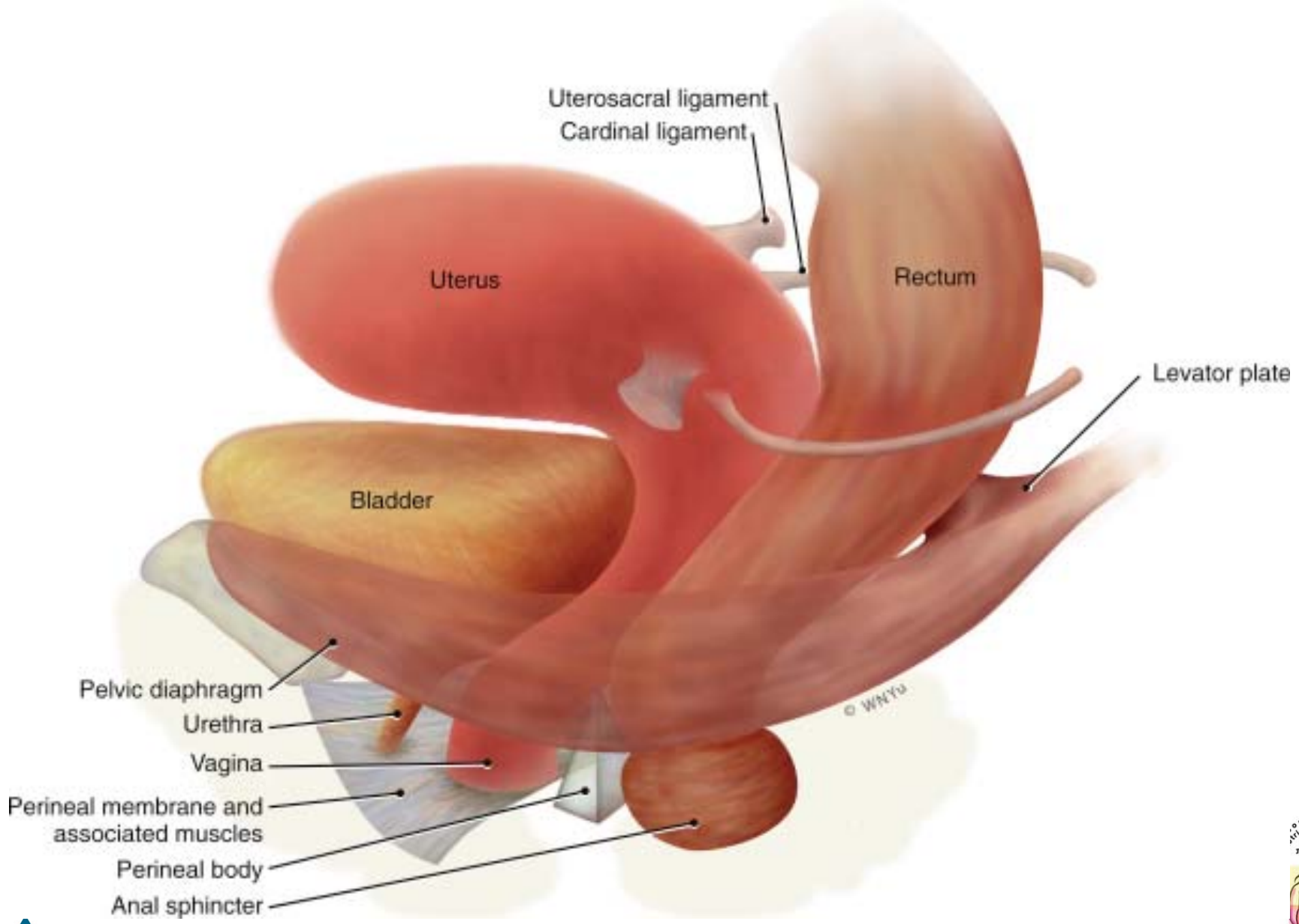
Internal anal sphincter

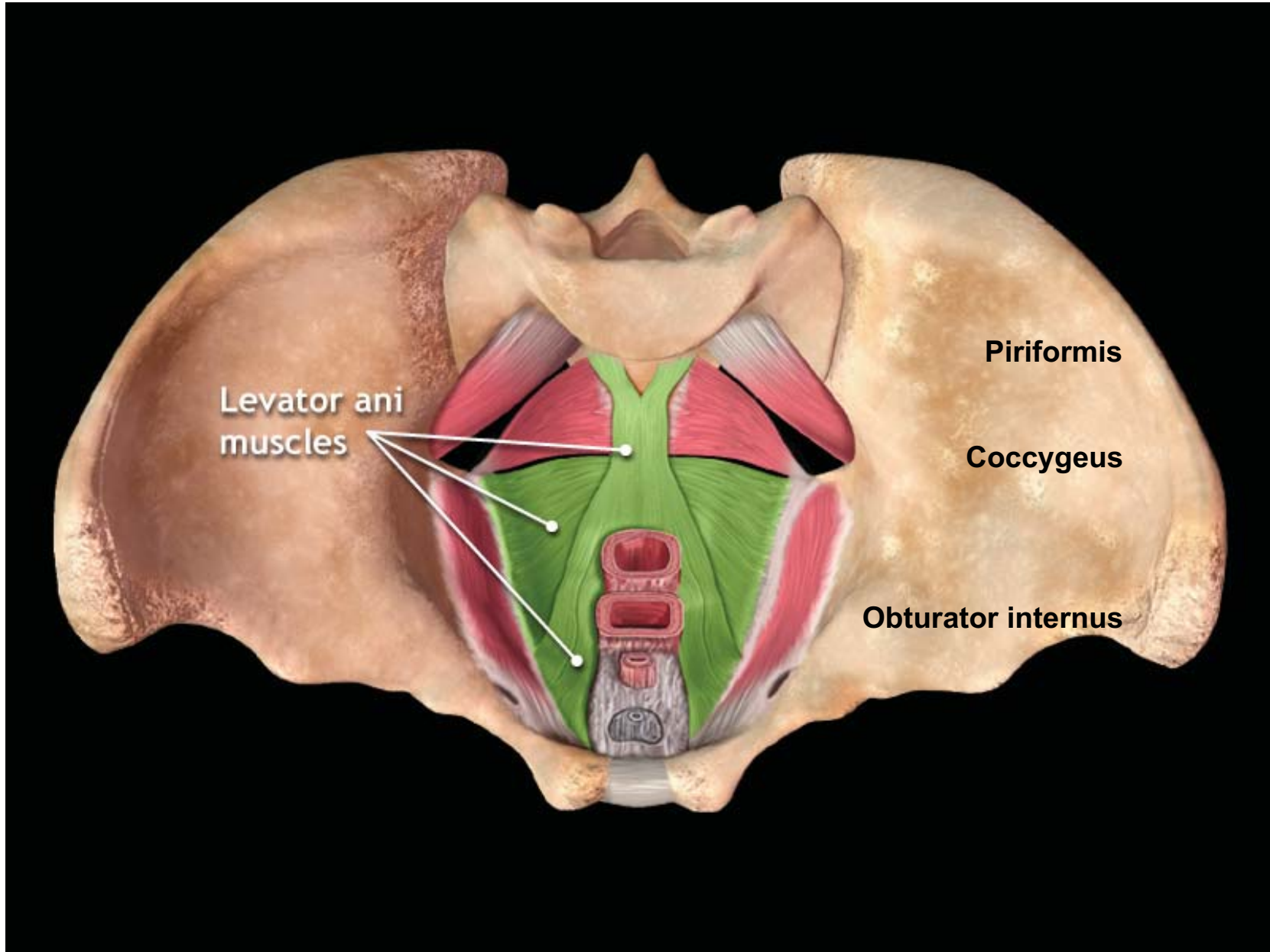
External anal sphincter

Fat









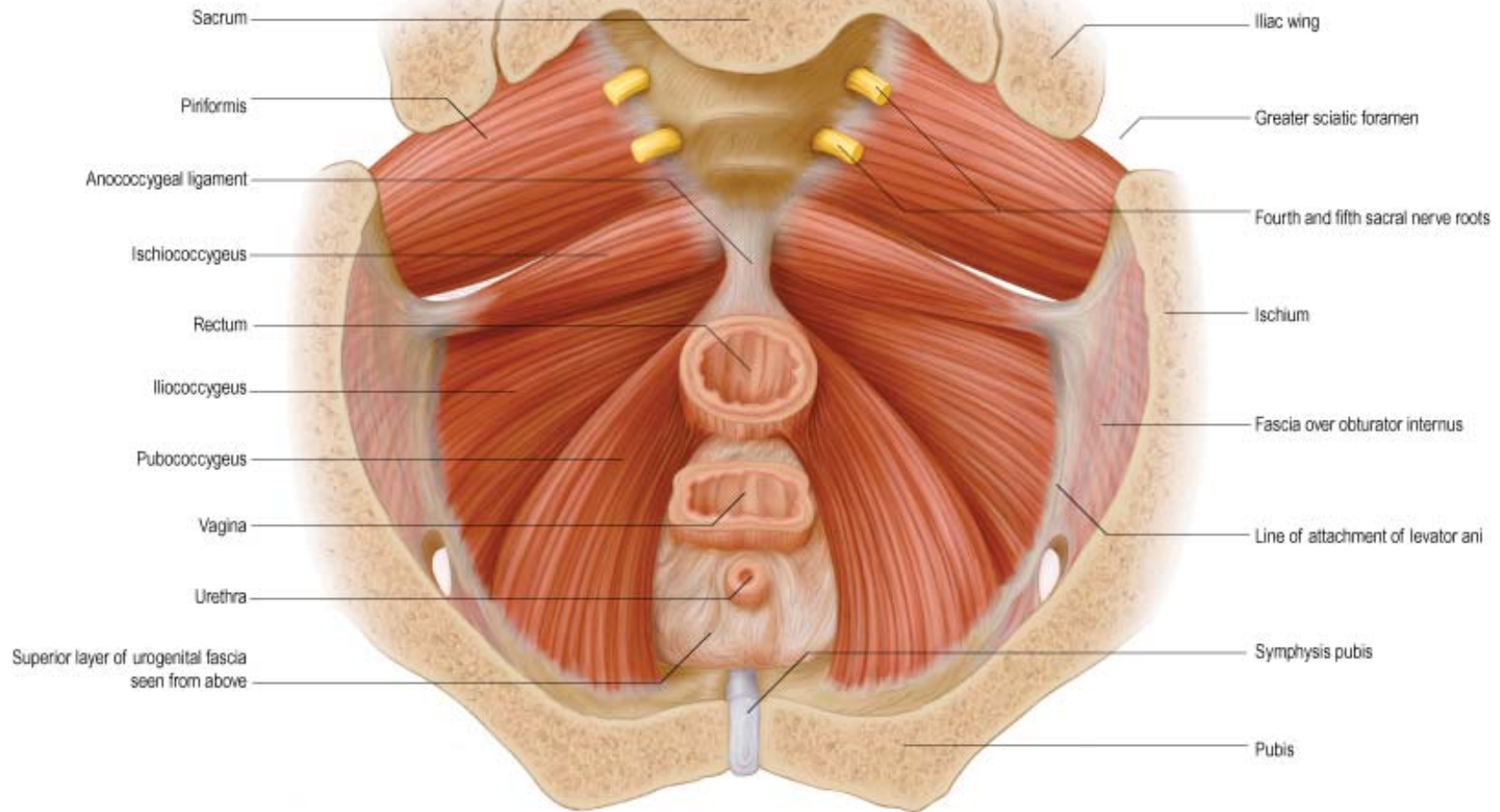
Levator ani
muscles

Piriformis

Coccygeus

Obturator internus





Levator Ani

■ Pubococcygeus

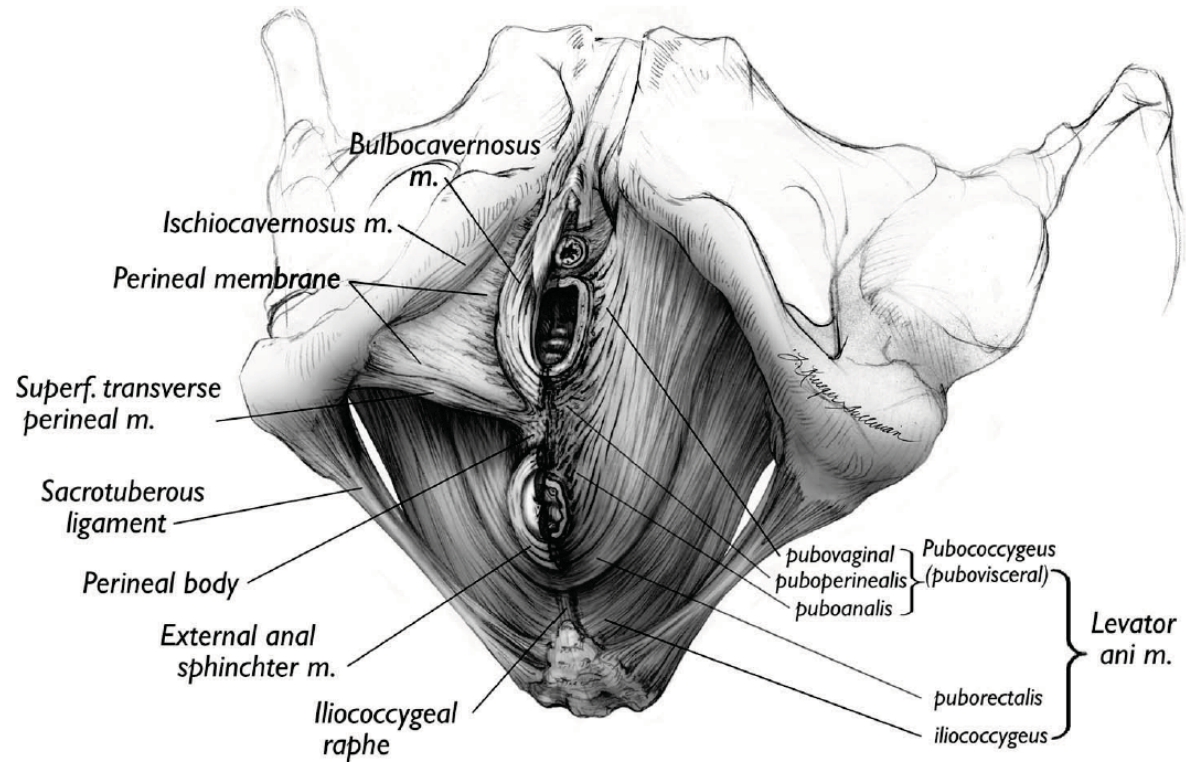
■ Pubo-vaginal

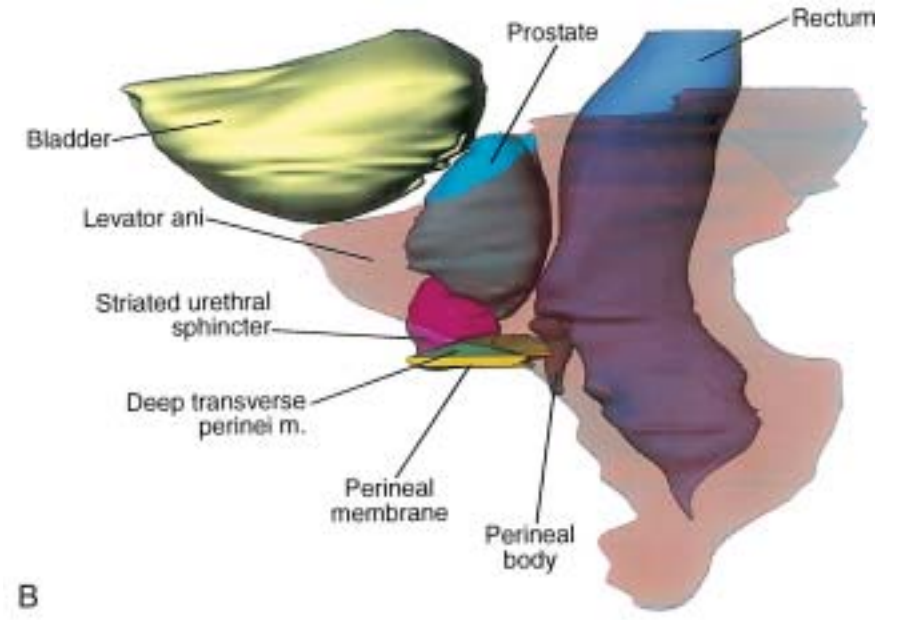
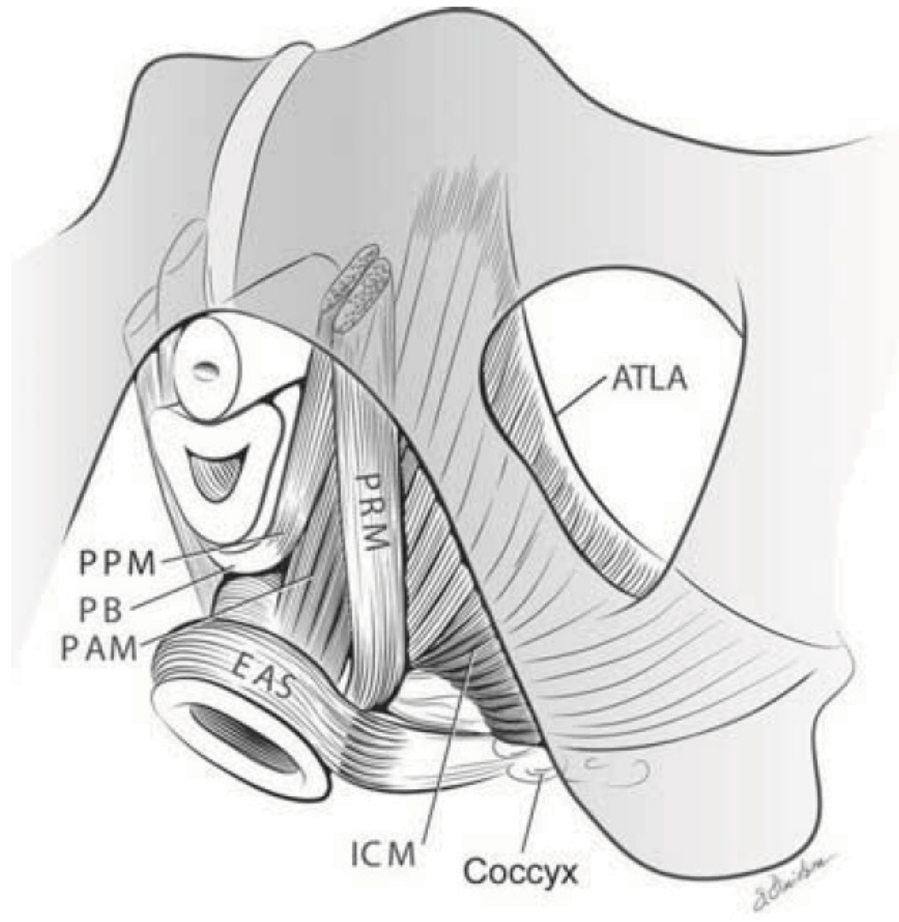
■ Pubo-perineal

■ Pubo-anal

■ Pubo-rectal

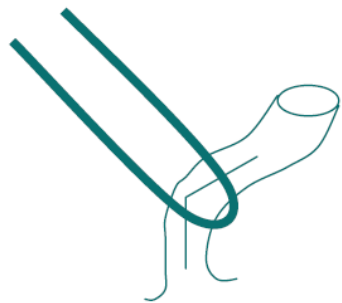
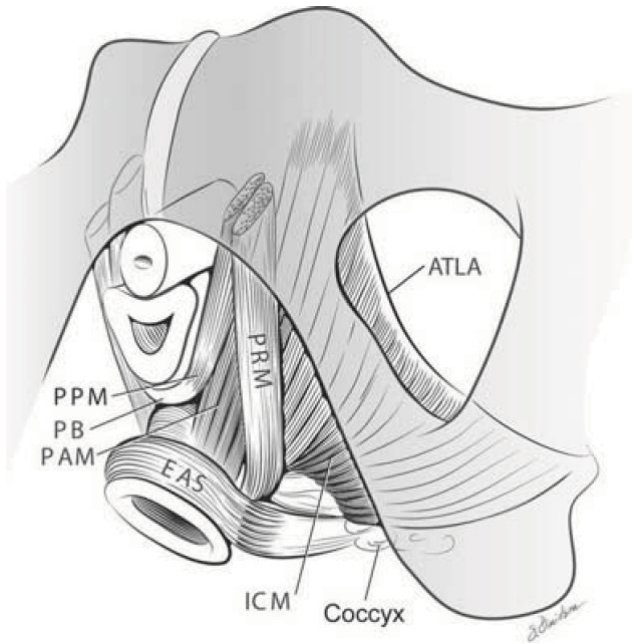
■ Iliococcygeus



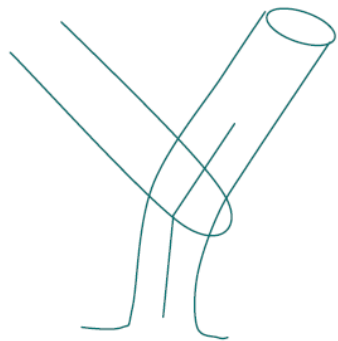


B

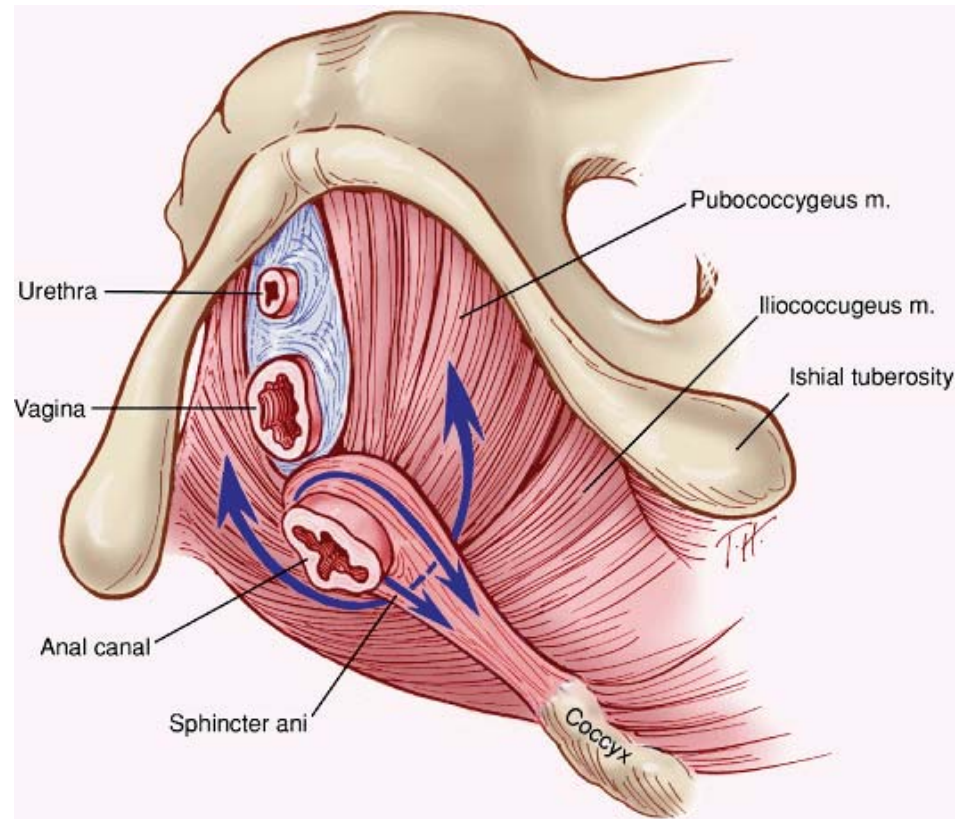




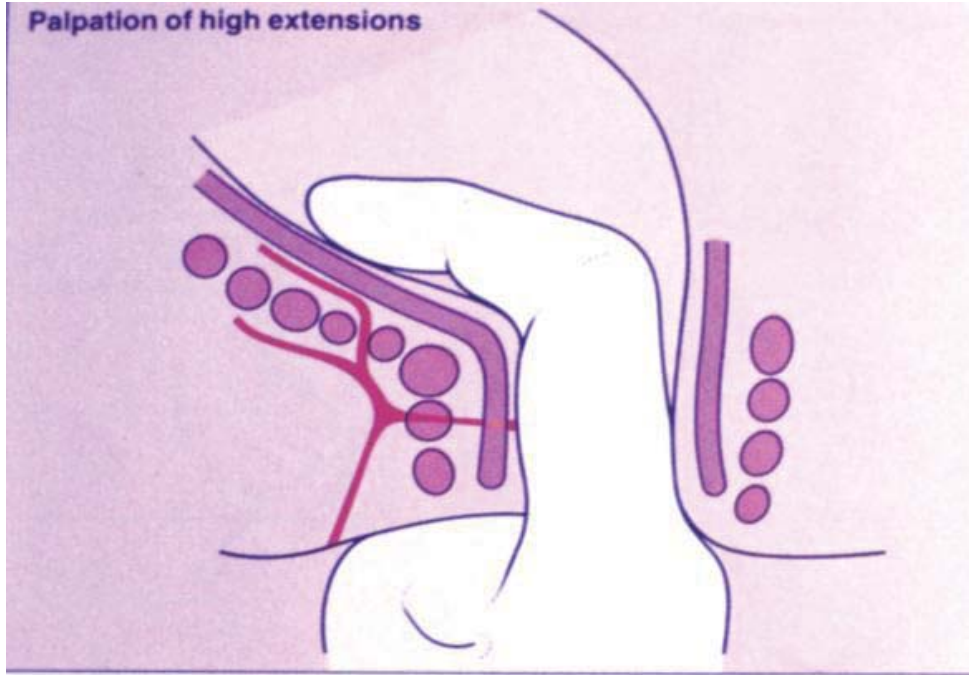
Contracted
Puborectalis Increases
Ano-Rectal Angle



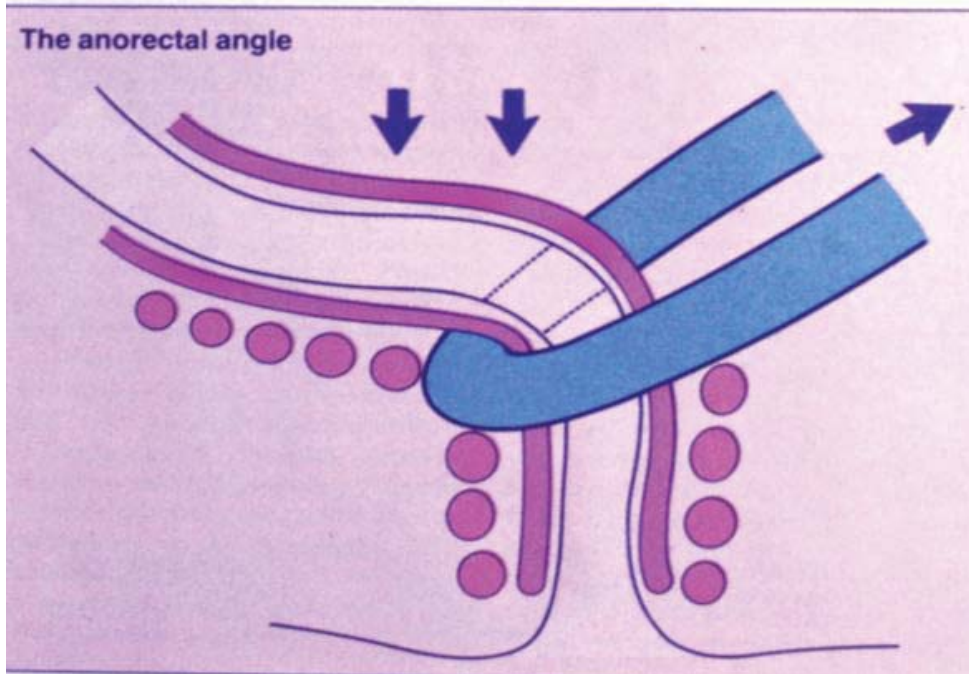
Relaxed
Puborectalis Decreases
Ano-Rectal Angle



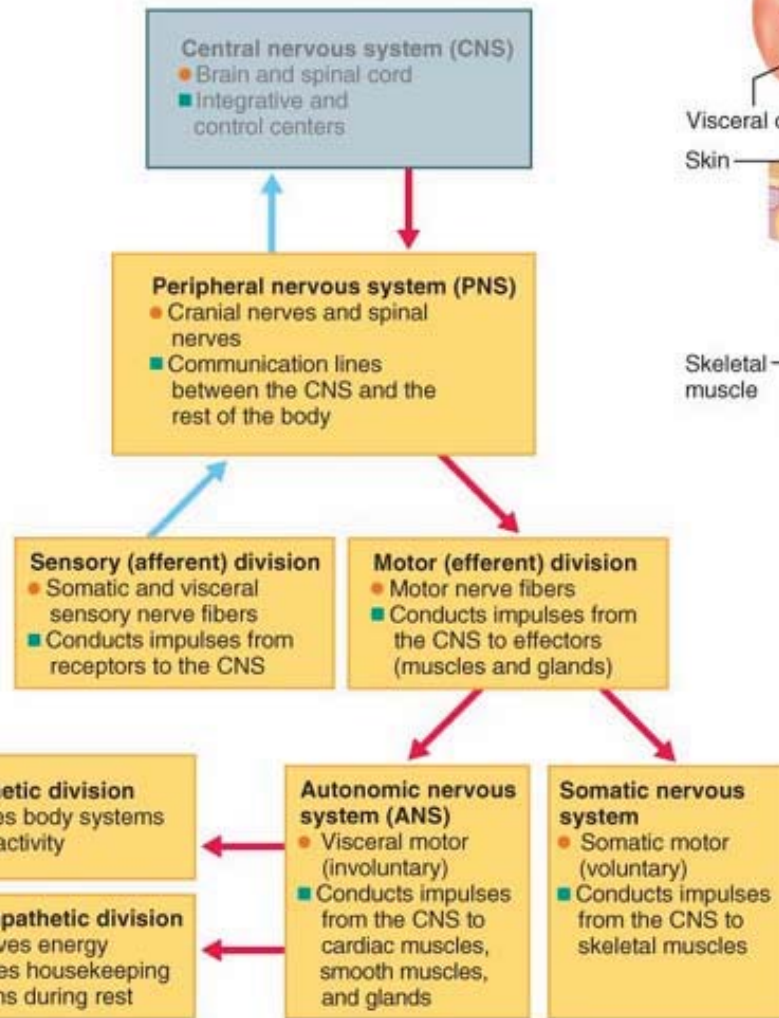
Palpation of high extensions



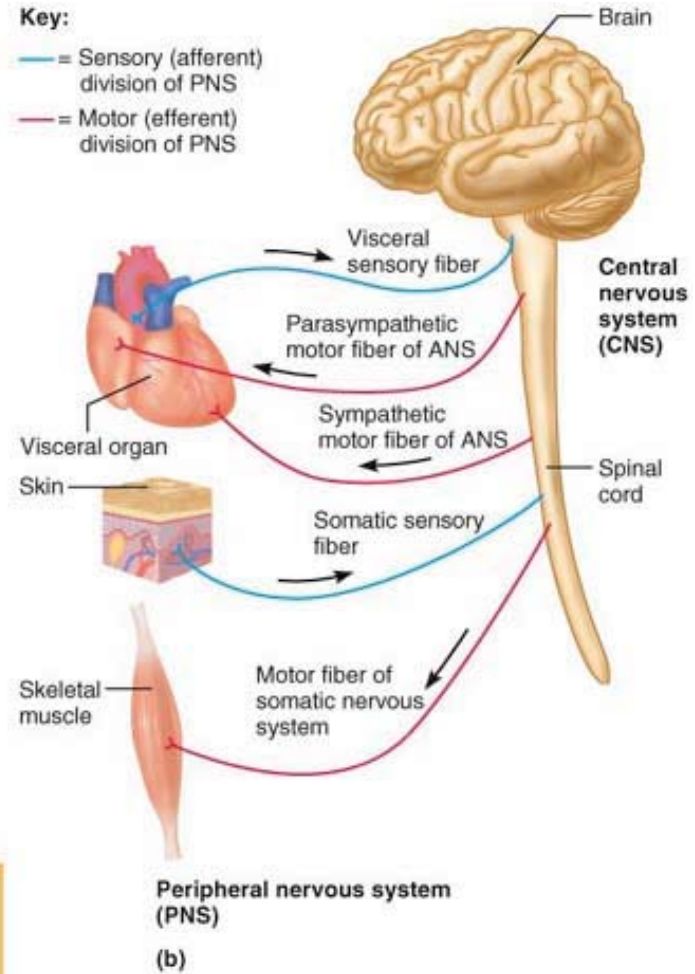
The anorectal angle



Key:
 ● = Structure
 ■ = Function

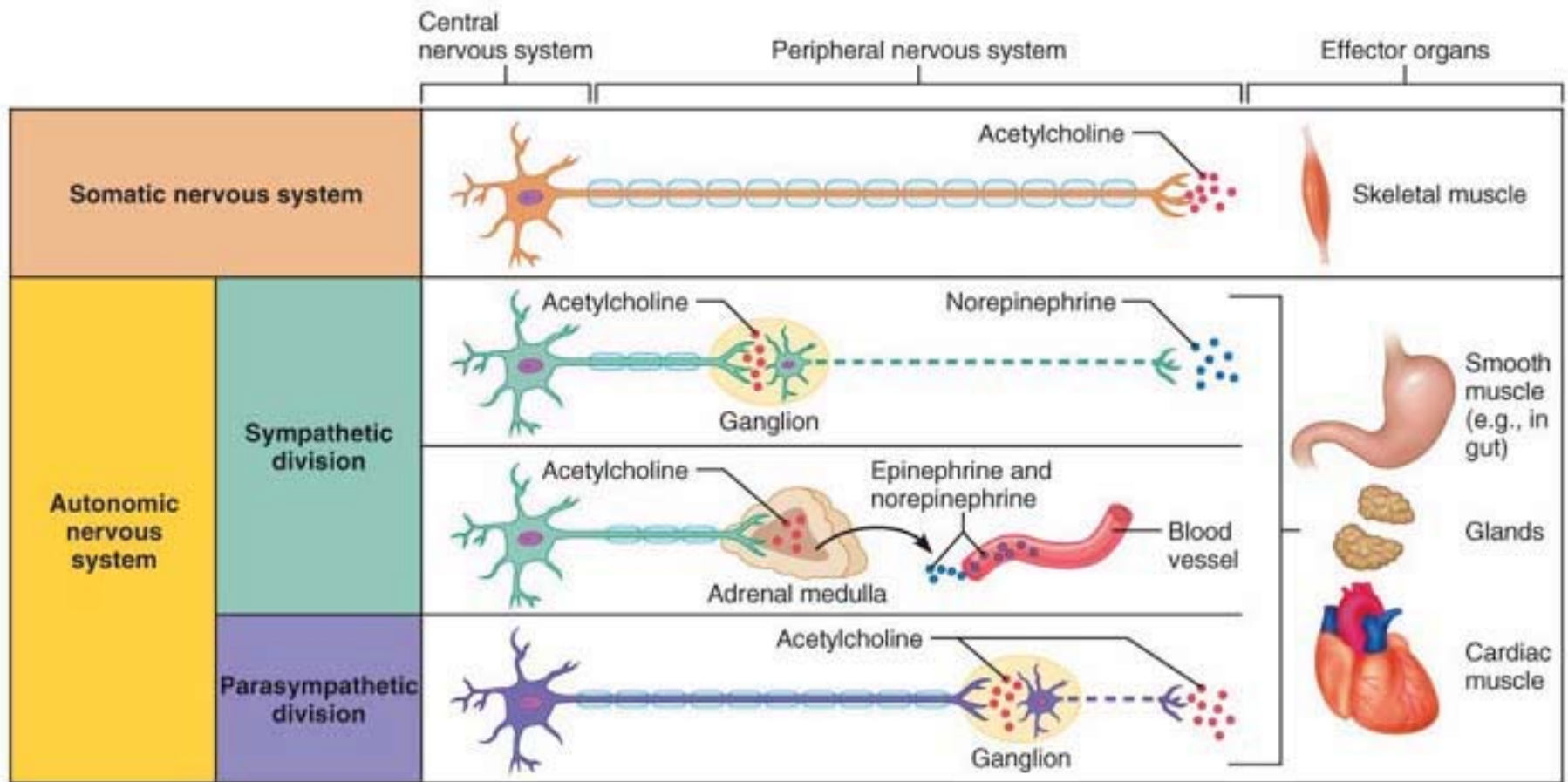


(a)



(b)

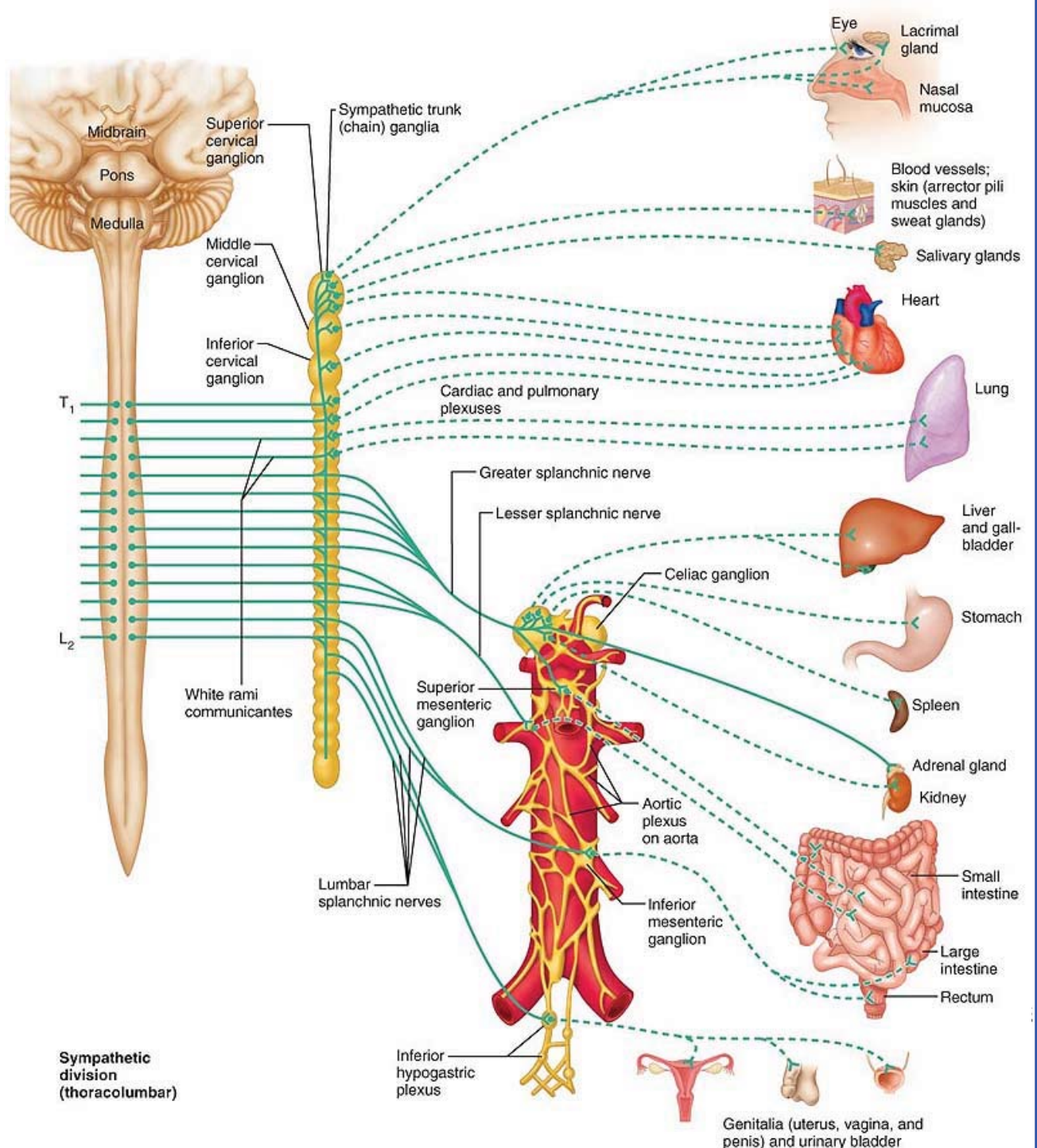
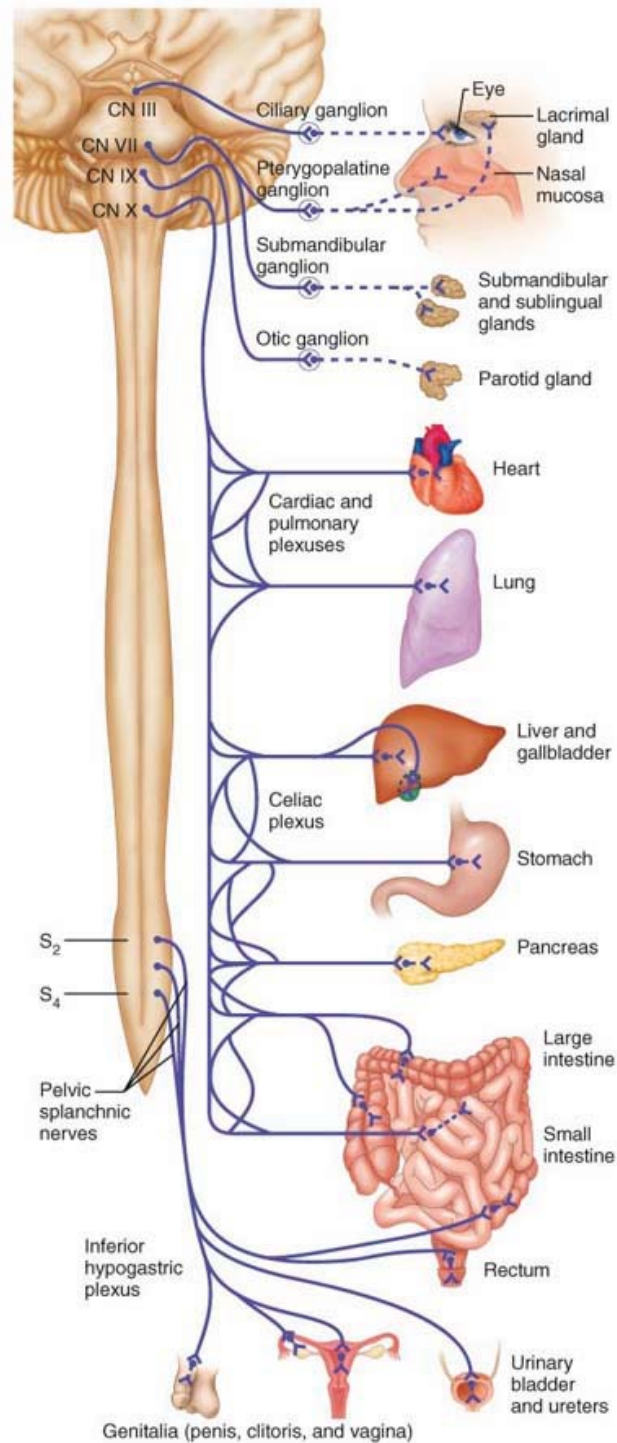


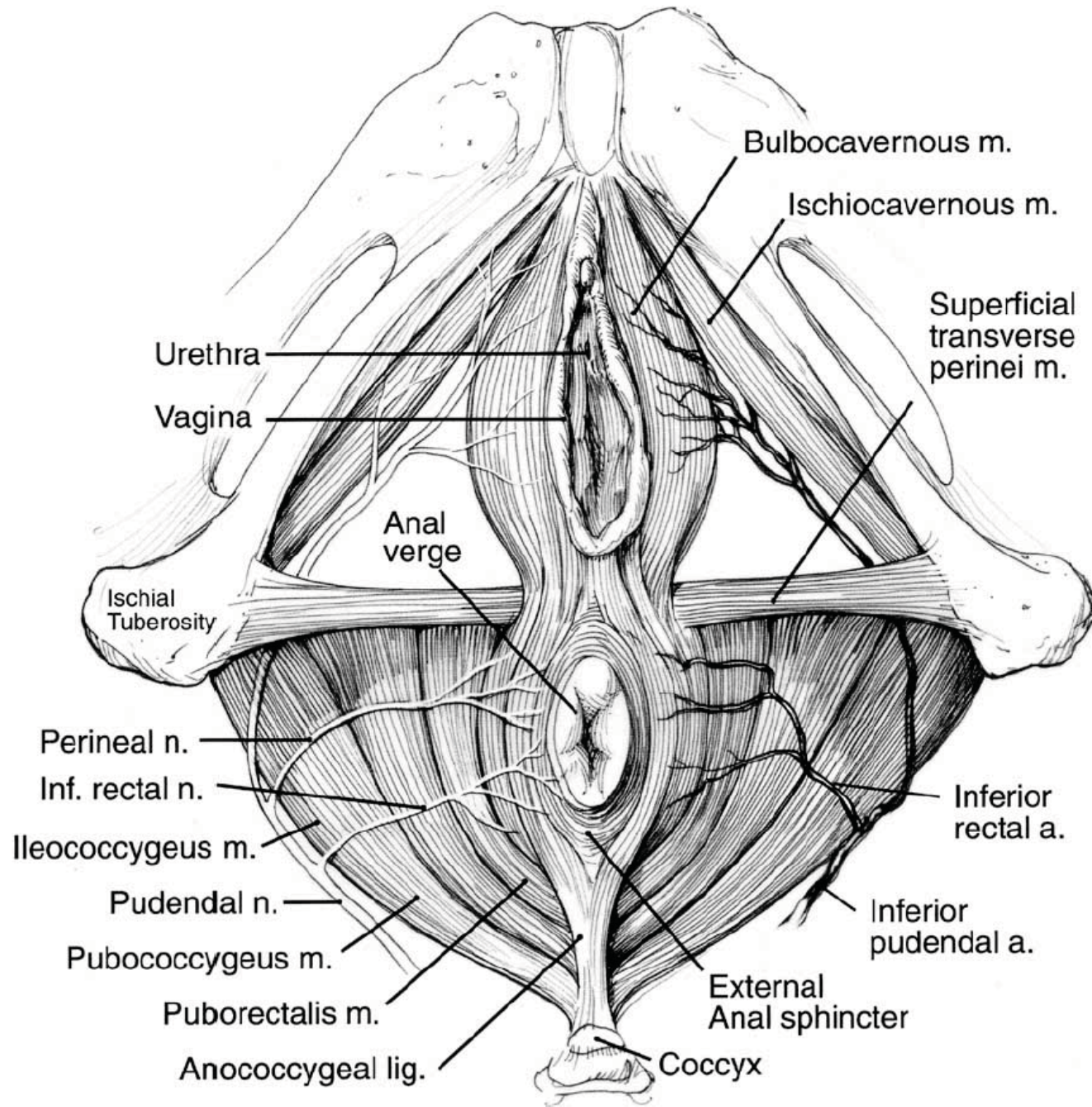


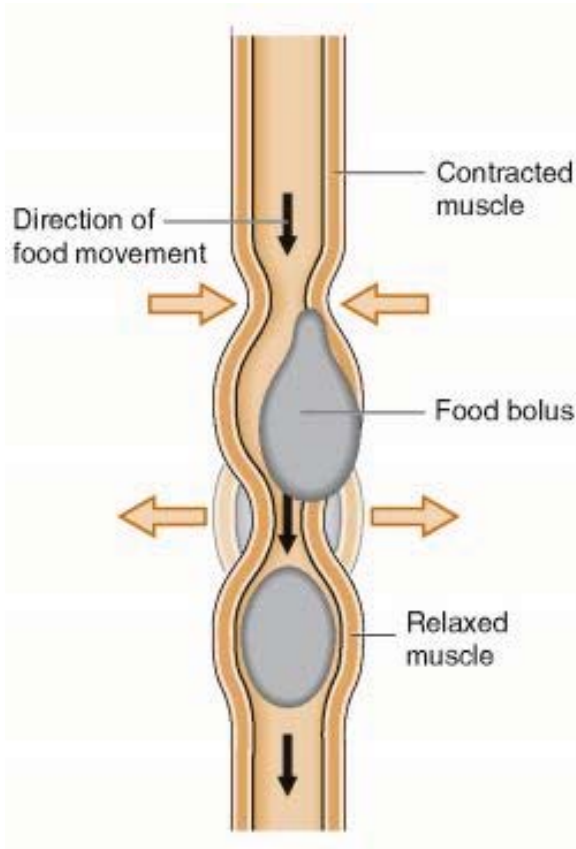
Key:

- = Preganglionic axons (sympathetic)
- - - = Postganglionic axons (sympathetic)
- = Myelination
- = Preganglionic axons (parasympathetic)
- - - = Postganglionic axons (parasympathetic)









- Large intestine musculature – inactive

- Haustral contractions:

- Slow segmenting movements (last 1 min, every 30 min)

- Mainly in the transverse and descending colon

- Mass peristalsis:

- Long, slow-moving, powerful contractile waves

- Large areas of the colon

- Force the contents toward the rectum

- 3-4 times daily

- Occur during or just after eating



From cerebral cortex (conscious control)

1. Distension / Stretch of rectal walls → sensory fibers

2. PS motor fibers → contraction of IAS

3. Voluntary contraction → contraction of EAS

Sensory nerve fibers

Voluntary motor nerve to external anal sphincter

③

②

①

Sigmoid colon

Involuntary motor nerve (parasympathetic division)

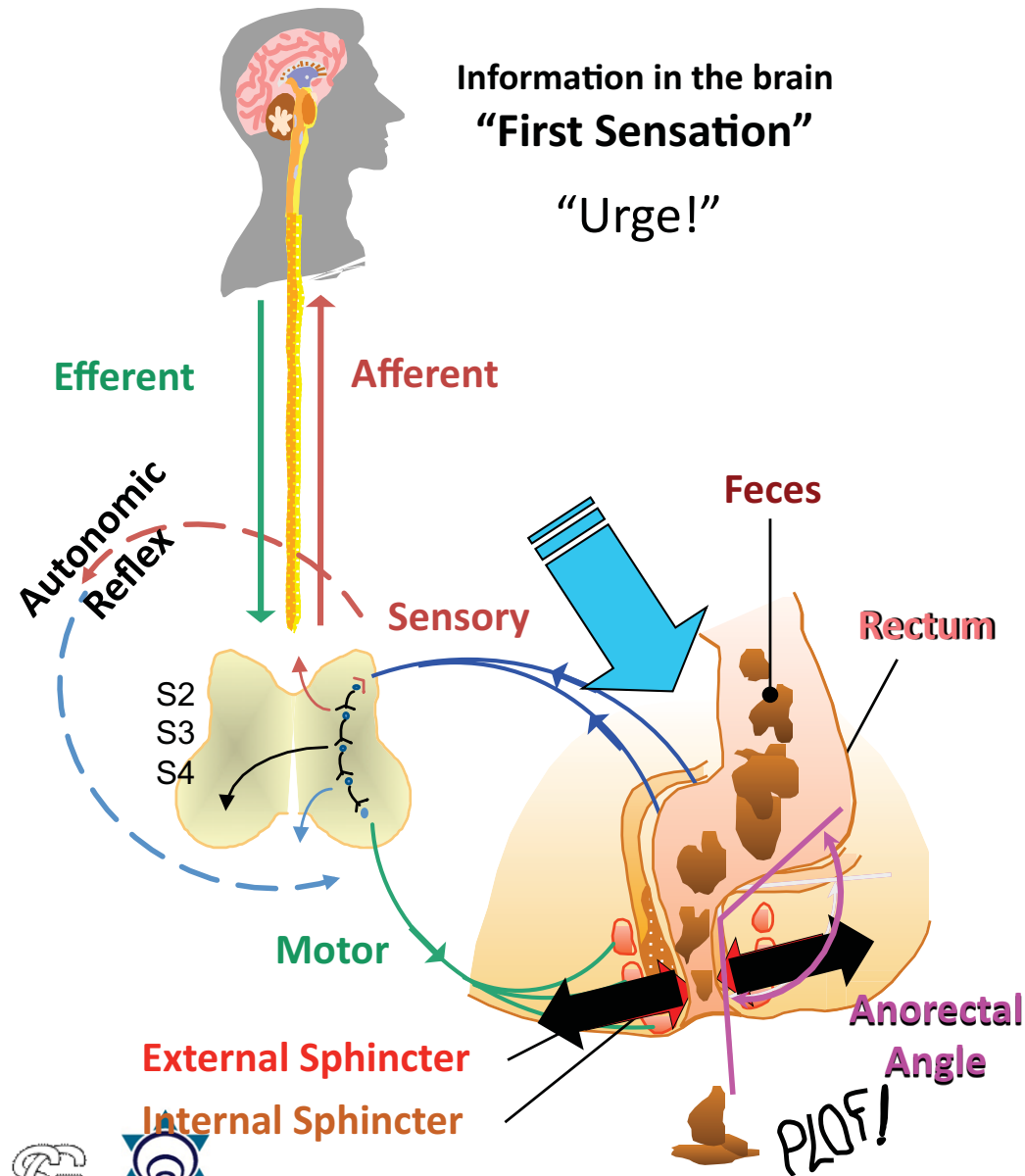
Rectum

Internal anal sphincter (smooth muscle)

External anal sphincter (skeletal muscle)



Ano-rectal Mechanism



Rectum Filling expands **Rectum Wall** as a *continuous Stimulation*



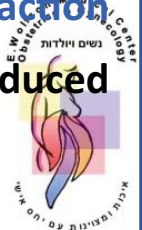
Transferred to the brain via **Sensory Pathways** and interpreted as a Sensation

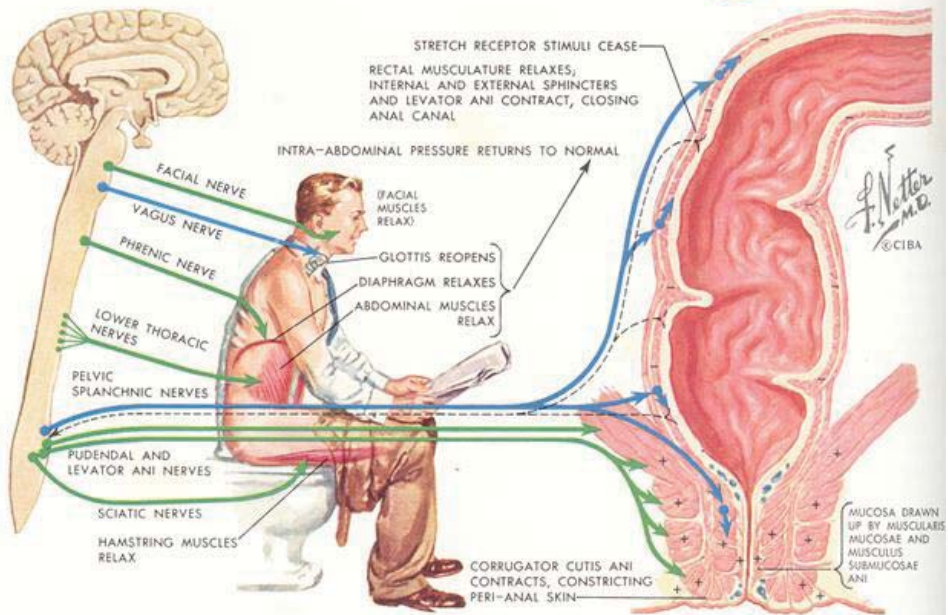
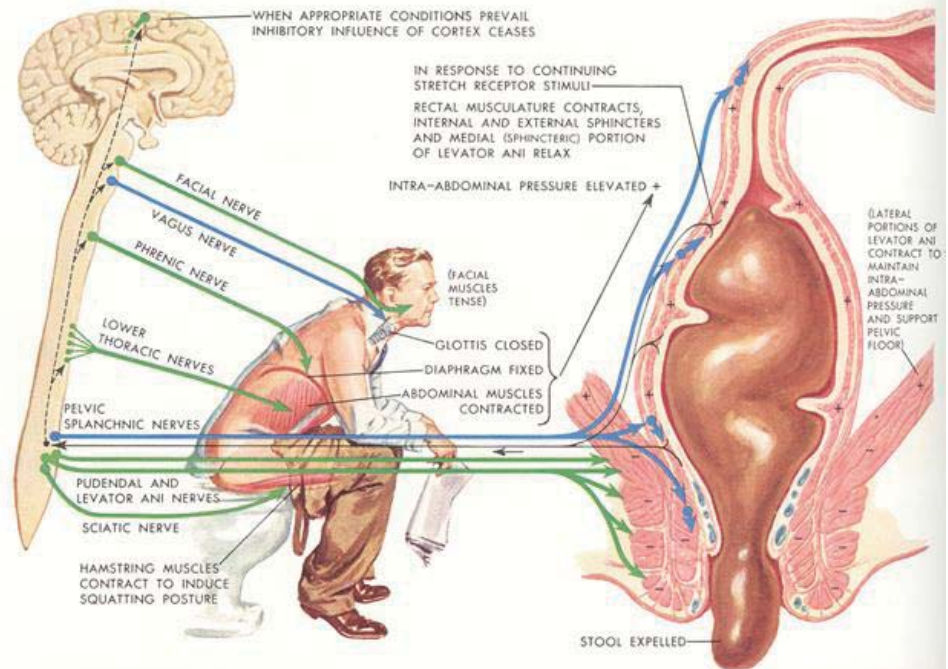
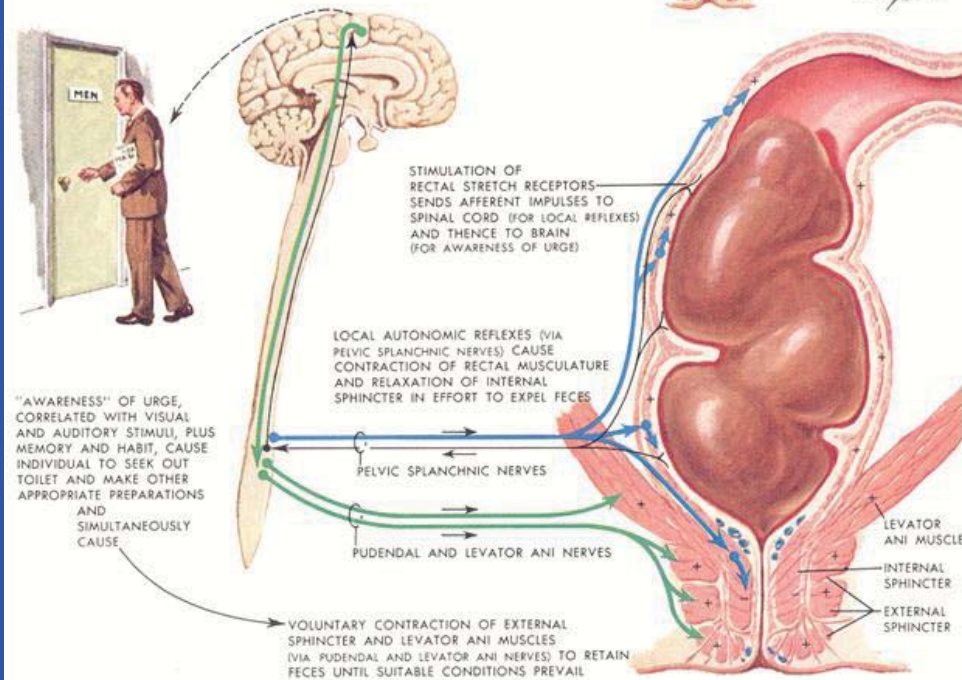
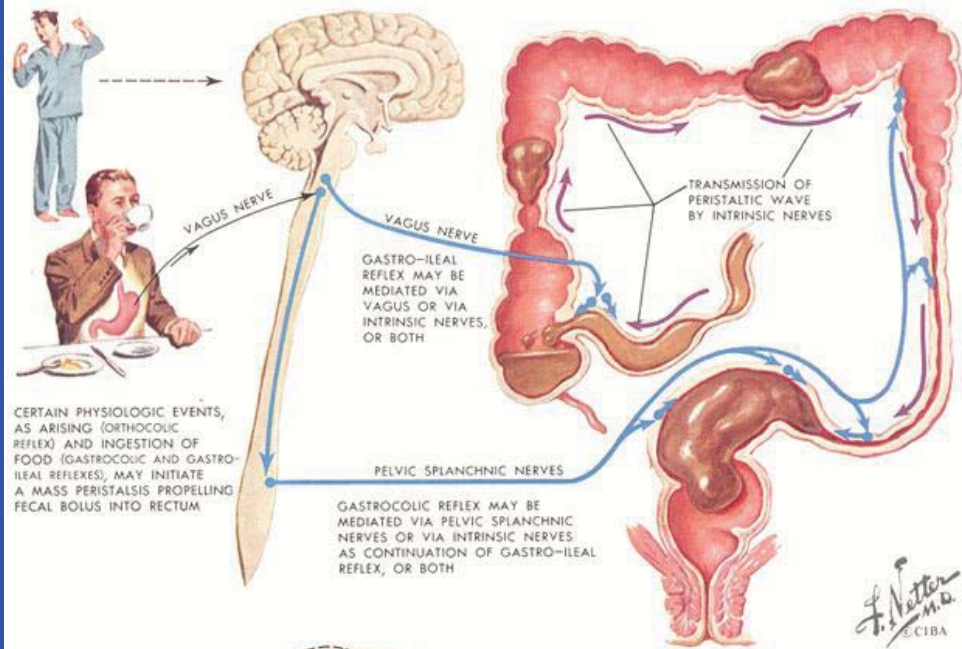
Autonomic Reflex controls the Recto-Anal Inhibitory Reflex

“Urge” → Voluntary contraction of **External Anal Sphincter**

Defecation Process

- Relaxation of **EAS**
- Abdominal **Walls Contraction**
- **Ano-rectal Angle Reduced**





OASIS Prevalence

- Reported European and American prevalence of OASIS is 2 - 4% of all vaginal singleton deliveries

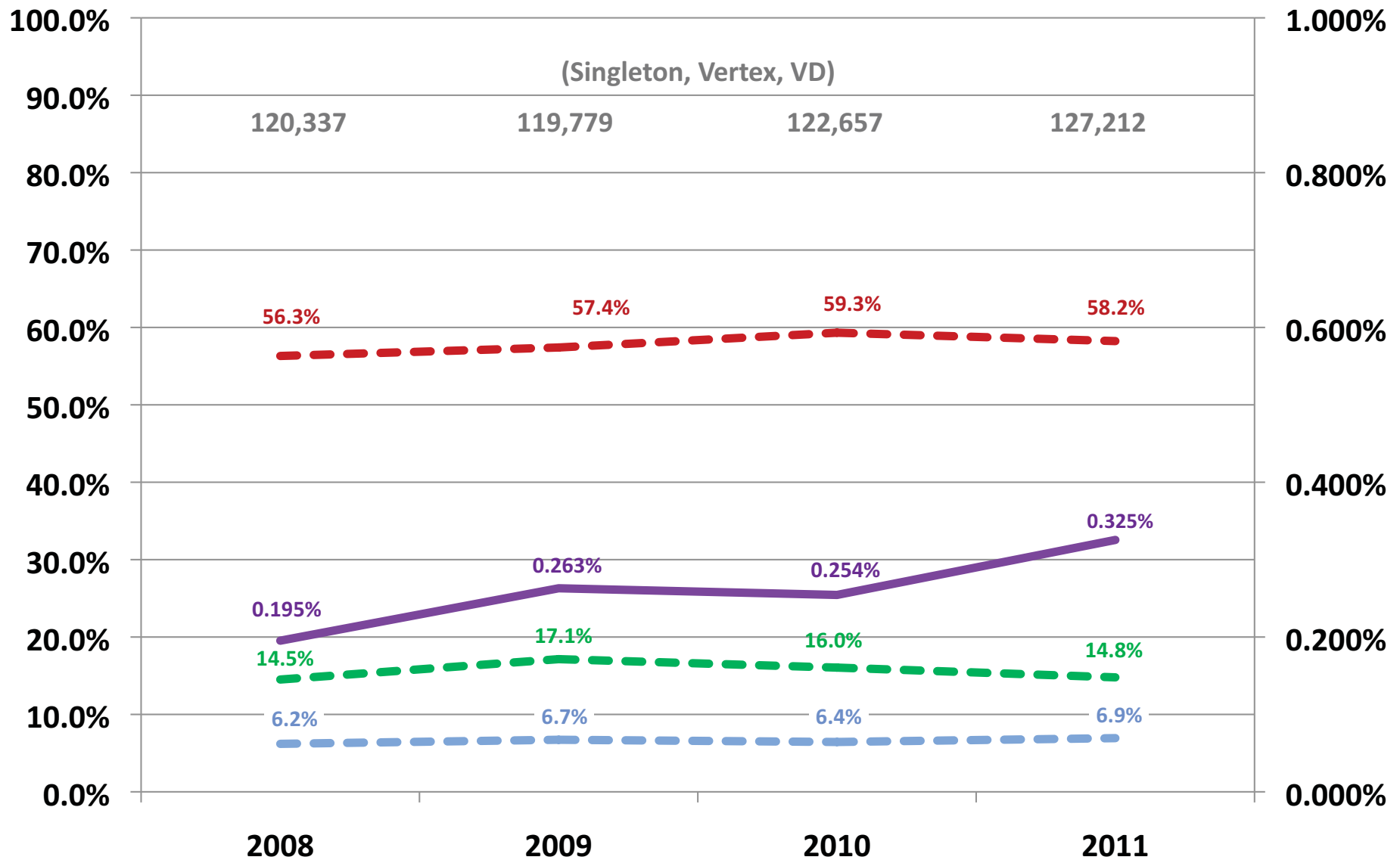
Dudding TC et al, Ann Surg, 2008

- Reported rate of OASIS in Israel is lower by tenfold:

- *Sheiner E et al, Arch Gynecol Obstet, 2005:* 0.1%
- *Groutz A et al, Am J Obstet Gynecol, 2011:* 0.25%
- *Zafran N & Salim R, Arch Gynecol Obstet, 2012:* 0.4%
- *Yogev Y et al, J Matern Fetal Neonatal Med, 2013:* 0.3%



Israel Society Maternal Fetal Medicine - National Survey



— Instrumental delivery — Epidural — Episiotomy — 3rd & 4th degree tear



Third- and fourth-degree perineal tears: prevalence and risk factors in the third millennium

Asnat Groutz, MD; Joseph Hasson, MD; Anat Wengier, MD; Ronen Gold, MD; Avital Skornick-Rapaport, MD; Joseph B. Lessing, MD; David Gordon, MD

Am J Obstet Gynecol 2011;204:347.e1-4

From the Urogynecology and Pelvic Floor Unit, Department of Obstetrics and Gynecology, Lis Maternity Hospital, Tel Aviv Sourasky Medical Center, Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel.

- 50,905 (2005 – 2009)
- 38,252 - Singleton, Vertex, VD
- 96 (0.25%): 3rd (84) or 4th (12) degree perineal tears

Significant independent risk factors in multivariate logistic regression model

Variable	Odds	95% CI	P
Asian ethnicity	8.94	4.23–18.86	< .001
Primipara	2.38	1.51–3.75	< .001
Vacuum extraction	2.68	1.57–4.55	< .001
Persistent occipito posterior	2.11	1.0–4.46	.049
Birthweight, g	1.001	1.0–1.001	< .001



Risk Factors for Anal Sphincter Tear During Vaginal Delivery

Mary P. FitzGerald, MD, Anne M. Weber, MD, MS, Nancy Howden, MD, MS, Geoffrey W. Cundiff, MD, and Mort B. Brown, PhD, for the Pelvic Floor Disorders Network*

Obstet Gynecol 2007;109:29–34

Childbirth and Pelvic Symptoms (CAPS) study

Maternal, Infant, and Delivery Characteristics of 797 Primiparous Women With and Without Anal Sphincter Tear After Vaginal Delivery

Characteristic	Sphincter Tear (n=407)	Vaginal Control (n=390)	p*
Maternal			
Age (y)	27.6±6.0	25.8±5.7	<.001
Race			
White	298 (73)	258 (66)	.002 [†]
Black	62 (15)	95 (24)	
Other	47 (12)	37 (9)	
Body mass index (kg/m ²)			
Prepregnancy	24.6±5.6	25.3±5.7	.10
Predelivery	31.2±6.2	31.8±6.5	.11
Diabetes	5 (1)	0	.06
Infant			
Gestational age at delivery (wk)	39.9±1.1	39.6±1.1	.003
Prolonged gestation [‡]	48 (12)	27 (7)	.021
Birth weight (g)	3,560±444	3,358±417	<.001
Macrosomia [§]	69 (17)	25 (6)	<.001
Head circumference (cm)	34.6±1.6	34.0±1.8	<.001
Labor and delivery			
Second-stage labor (h)	1.9±1.4	1.4±1.1	<.001
Prolonged second stage	138 (34)	66 (17)	<.001
Fetal head position OP	52 (13)	21 (5)	<.001
Epidural analgesia	366 (90)	336 (86)	.10
Episiotomy [¶]	204 (50)	98 (26)	<.001
Forceps	122 (30)	25 (6)	<.001
Vacuum	101 (25)	38 (10)	<.001
Either forceps or vacuum	210 (52)	62 (16)	<.001
Both forceps and vacuum	13 (3)	1 (0.3)	.002



Multivariable Analysis With Anal Sphincter Tear as Primary Outcome, Controlling for Maternal Age, Race, and Gestational Age

Characteristic	Estimated OR for Factor Being Related to Tear	95% Lower Confidence Limit for OR	95% Upper Confidence Limit for OR
No vacuum, forceps, episiotomy or OP (reference group)	1.0		
Forceps	13.6	7.9	23.2
Fetal position OP	7.0	3.8	12.6
Vacuum	6.3	4.0	10.1
Prolonged second stage	5.6	3.6	8.6
Episiotomy	5.3	3.8	7.6
Epidural	3.2	1.6	6.2
Forceps + episiotomy	25.3	10.2	62.6
Prolonged second stage + forceps + episiotomy	24.4	6.9	86.5
Epidural + forceps + episiotomy	41.0	13.5	124.4
Prolonged second stage + epidural + forceps + episiotomy	40.6	8.6	191.8
OP + forceps	21.6	6.2	75.6
OP + vacuum	9.7	3.0	30.8
OP + episiotomy	15.9	5.8	43.2
OP + episiotomy + forceps	33.8	4.8	239.5
OP + episiotomy + epidural + forceps	∞	—	—

OR, odds ratio; OP, occiput posterior



Trends in Risk Factors for Obstetric Anal Sphincter Injuries in Norway

*Elham Baghestan, MD, Lorentz M. Irgens, MD, PhD, Per E. Bordahl, MD, PhD,
and Svein Rasmussen, MD, PhD*

Obstet Gynecol 2010;116:25–33

From the Institute of Clinical Medicine, University of Bergen; the Department of Obstetrics and Gynecology, Haukeland University Hospital; the Medical Birth Registry of Norway, Norwegian Institute of Public Health; and the Locus for Registry Based Epidemiology, Department of Public Health and Primary Health Care, University of Bergen, Bergen, Norway.

- **Population based cohort study**
- **Data from Medical Birth Registry of Norway**
- **1967 – 2004**
- **VD, Singleton, Vertex, ≥ 500 g**
- **Exclusion: - Women with their 1st birth before 1967**
 - Births with previous OASI
- **1,673,442 births**



Table 2. Frequencies, Crude and Adjusted Odds Ratios of Obstetric Anal Sphincter Injuries According to Maternal and Fetal Characteristics, and Obstetric Factors in Vaginal Vertex Deliveries With No Previous Obstetric Anal Sphincter Injuries in Norway, 1967 to 2004

Characteristic	1.8%	n (Total) (1,673,442)	Obstetric Anal Sphincter Injuries				
			n (30,110)	%	Crude OR (95% CI)	Adjusted OR (95% CI)	OR (95% CI)
Age (y)							
Younger than 20		123,566	1,447	1.2	0.6 (0.5–0.6)	0.6 (0.5–0.6)	
20–24		509,053	7,844	1.5	0.8 (0.7–0.8)	0.8 (0.7–0.8)	■ Age ≥30 y
25–29		588,072	11,841	2.0	Reference	Reference	
30–34		336,749	6,878	2.0	1.0 (1.0–1.1)	1.2 (1.1–1.2)	■ Primipara
35–39		102,690	1,893	1.8	0.9 (0.9–1.0)	1.3 (1.2–1.3)	
40 or older		13,306	207	1.6	0.8 (0.7–0.9)	1.3 (1.1–1.5)	■ Previous CS
Unknown		6	0	0			
Vaginal birth order							
1		816,806	23,764	2.9	3.5 (3.4–3.6)	4.8 (4.7–5.0)	
2		570,111	4,817	0.8	Reference	Reference	
3		220,006	1,253	0.6	0.7 (0.6–0.7)	0.5 (0.5–0.6)	
4		50,305	229	0.5	0.5 (0.5–0.6)	0.4 (0.3–0.4)	
5		11,004	36	0.3	0.4 (0.3–0.5)	0.2 (0.2–0.3)	
6		2,945	5	0.2	0.2 (0.1–0.5)	0.1 (0.1–0.3)	
7 or greater		2,265	6	0.3	0.3 (0.1–0.7)	0.1 (0.1–0.3)	
Previous cesarean and vaginal							
First birth		788,285	22,145	2.8	Reference	Reference	
Previous cesarean only		28,521	1,619	5.7	2.1 (2.0–2.2)	1.2 (1.1–1.3)	
Previous vaginal and cesarean		18,850	300	1.6	2.2 (2.0–2.5)	1.6 (1.4–1.8)	
Previous vaginal only		837,786	6,046	0.7	Reference	Reference	



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			n (30,110)	%	Crude OR (95% CI)	Adjusted OR (95% CI)	OR (95% CI)
Country of birth							
European		1618,211	28,422	1.8	Reference	Reference	
African		7,796	246	3.2	1.8 (1.6–2.1)	1.3 (1.1–1.5)	■ Age ≥30 y
Asian		33,936	1,138	3.4	1.9 (1.8–2.1)	1.6 (1.5–1.7)	■ Primipara
North American		7,843	157	2.0	1.1 (1.0–1.3)	0.9 (0.8–1.1)	■ Previous CS
Latin American		3,328	79	2.4	1.4 (1.1–1.7)	0.8 (0.7–1.1)	■ African / Asian
Oceanian		546	10	1.8	1.0 (0.6–2.0)	0.8 (0.4–1.6)	
Unknown		1,785	58	3.2	1.9 (1.4–2.4)	1.1 (0.8–1.4)	
Diabetes type 1*							
Yes		777	51	6.6	1.7 (1.3–2.3)	1.5 (1.1–2.0)	■ IDDM, GDM
No		265,260	10,372	3.9	Reference	Reference	
Diabetes type 2*							
Yes		345	13	3.8	1.0 (0.6–1.7)	1,0 (0.5–1.7)	
No		265,692	10,410	3.9	Reference	Reference	
Gestational diabetes*							
Yes		1,913	104	5.4	1.4 (1.2–1.7)	1.3 (1.1–1.6)	
No		264,124	10,319	3.9	Reference	Reference	



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			n (30,110)	%	Crude OR (95% CI)	Adjusted OR (95% CI)	OR (95% CI)
Instrumental delivery							
Forceps		41,666	3,386	8.1	6.3 (6.0–6.5)	3.9 (3.7–4.0)	■ Age ≥30 y
Vacuum		78,534	4,718	6.0	4.5 (4.4–4.7)	2.0 (1.9–2.1)	
Vacuum and forceps		4,302	443	10.3	8.1 (7.4–9.0)	3.9 (3.5–4.3)	
Noninstrumental		1,548,940	21,563	1.4	Reference	Reference	■ Primipara
Episiotomy*							
Yes		55,594	3,771	6.8	2.2 (2.1–2.3)	1.2 (1.2–1.3)	■ Previous CS
No		210,443	6,652	3.2	Reference	Reference	■ African / Asian
Induction by prostaglandin*							
Yes		16,062	819	5.1	1.3 (1.3–1.4)	1.2 (1.1–1.3)	■ IDDM, GDM
No		249,975	9,604	3.8	Reference	Reference	■ ID (V / F)
Epidural							
Yes		137,680	5,641	4.1	2.6 (2.6–2.7)	1.1 (1.0–1.1)	■ Episiotomy
No		1,535,762	24,469	1.6	Reference	Reference	■ PG induction



Table 2. Frequencies, Crude and Adjusted Odds Ratios of Obstetric Anal Sphincter Injuries According to Maternal and Fetal Characteristics, and Obstetric Factors in Vaginal Vertex Deliveries With No Previous Obstetric Anal Sphincter Injuries in Norway, 1967 to 2004

Characteristic	1.8%	n (Total) (1,673,442)	Obstetric Anal Sphincter Injuries				
			n (30,110)	%	Crude OR (95% CI)	Adjusted OR (95% CI)	OR (95% CI)
Birth weight (g)							
Less than 2,500		47,378	127	0.3	0.2 (0.2–0.2)	0.2 (0.2–0.2)	
2,500–2,999		166,110	1,239	0.7	0.6 (0.5–0.6)	0.5 (0.5–0.6)	■ Age ≥30 y
3,000–3,499		535,098	6,949	1.3	Reference	Reference	■ Primipara
3,500–3,999		607,483	11,908	2.0	1.5 (1.5–1.6)	1.6 (1.6–1.7)	■ Previous CS
4,000–4,499		260,068	7,522	2.9	2.3 (2.2–2.3)	2.7 (2.6–2.7)	■ African / Asian
4,500–4,999		51,043	2,056	4.0	3.2 (3.0–3.4)	4.2 (4.0–4.4)	■ IDDM, GDM
5,000 or greater		6,262	309	4.9	4.0 (3.5–4.4)	5.9 (5.3–6.7)	■ ID (V / F)
Head circumference (cm)[†]							
Less than 33		36,813	355	1.0	0.6 (0.5–0.6)		■ Episiotomy
33–34		294,407	4,897	1.7	Reference		■ PG induction
35–36		588,594	13,800	2.3	1.4 (1.4–1.5)		■ BW ≥3,500 g
37–38		198,125	6,936	3.5	2.1 (2.1–2.2)		■ HC ≥35 cm
39–40		12,754	653	5.1	3.2 (2.9–3.5)		
41 or greater		471	24	5.1	3.2 (2.1–4.8)		
Unknown		11,217	206	1.8	1.1 (1.0–1.3)		



Obstetric anal sphincter injury, risk factors and method of delivery – an 8-year analysis across two tertiary referral centers

Mark P. Hehir¹, Hugh D. O'Connor², Shane Higgins¹, Michael S. Robson¹, Fionnuala M. McAuliffe¹, Peter C. Boylan¹, Fergal D. Malone², and Rhona Mahony¹

¹Department of Obstetrics and Gynaecology, National Maternity Hospital, Holles St., Dublin 2, Ireland and ²RCSI Academic Unit, Rotunda Hospital, Dublin 1, Ireland

J Matern Fetal Neonatal Med, 2013; 26(15): 1514–1516

- **2003 – 2010 (8y), 2 hospitals**
- **VD: 100,307**
- **OASIS: 2121 (2.1%)** PP: 3.5% ($\frac{1601}{45,240}$), MP: 0.9% ($\frac{520}{55,067}$)
- **Macrosomia (>4kg): 16.7%**
- **MLE: 19.1%**

Incidence of obstetric anal sphincter injury according to mode of delivery

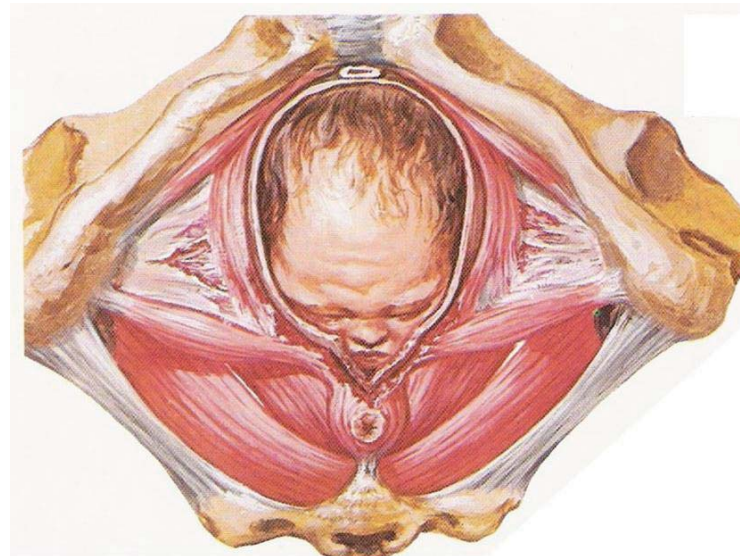
Mode of delivery	Rate of OASIS	Risk compared with SVD
Spontaneous vaginal delivery	1.3% (1109/80 014)	N/A
Vacuum-assisted delivery	3.7% (559/15 060)	$p < 0.0001$; OR: 2.9, CI: 2–2.6
Forceps-assisted delivery	8.6% (453/5233)	$p < 0.0001$; OR: 7.1, CI: 6.4–7.9

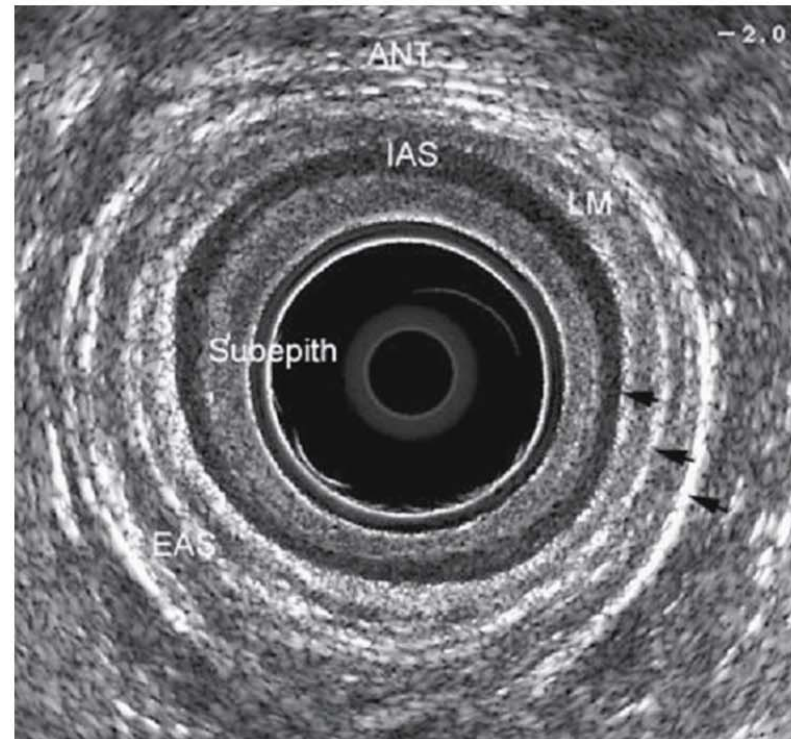
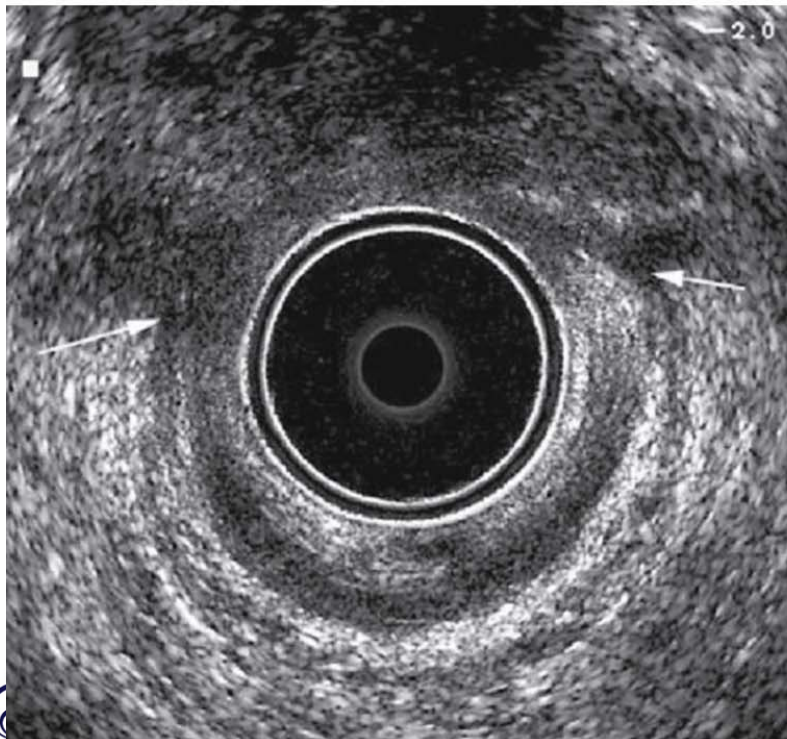
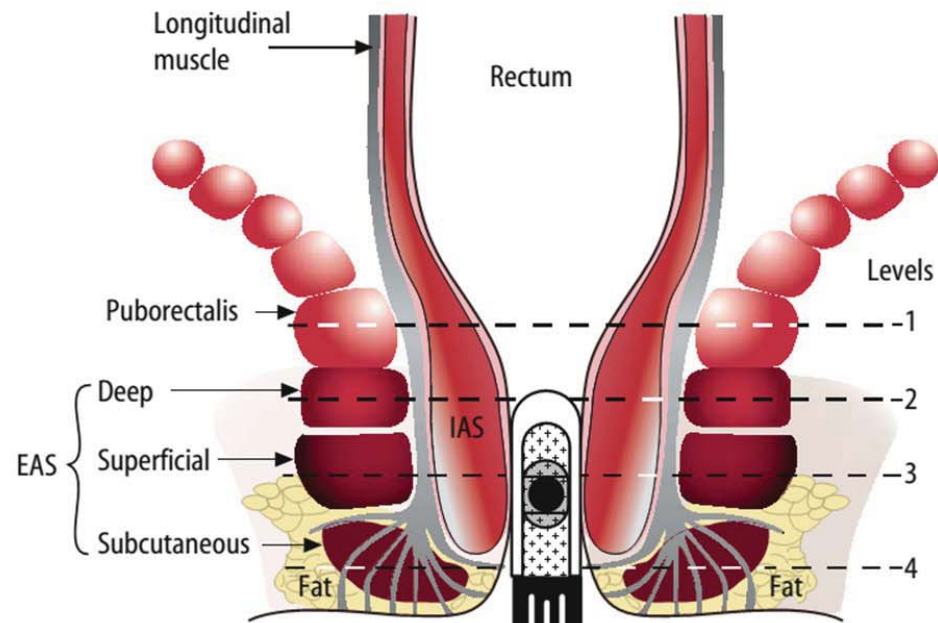


Obstetric Anal Sphincter Injury (OASI):

Diagnosis

Shimon Ginath, MD







Anal-Sphincter Disruption during Vaginal Delivery

Abdul H. Sultan, Michael A. Kamm, Christopher N. Hudson, Janice M. Thomas, and Clive I. Bartram

- 202 consecutive women 6w before delivery
- 150 of them 6w after delivery

PARITY GROUP	ANAL-SPHINCTER DEFECTS			TOTAL
	INTERNAL SPHINCTER	EXTERNAL SPHINCTER	INTERNAL AND EXTERNAL	
	<i>no. with defect (%)</i>			
Primiparous women (n = 79)				
Before delivery	0	0	0	0
After delivery	13 (16)	5 (6)	10 (13)	28 (35)
Multiparous women (n = 48)				
Before delivery	8 (17)	2 (4)	9 (19)	19 (40)
After delivery	7 (15)	2 (4)	12 (25)	21 (44)



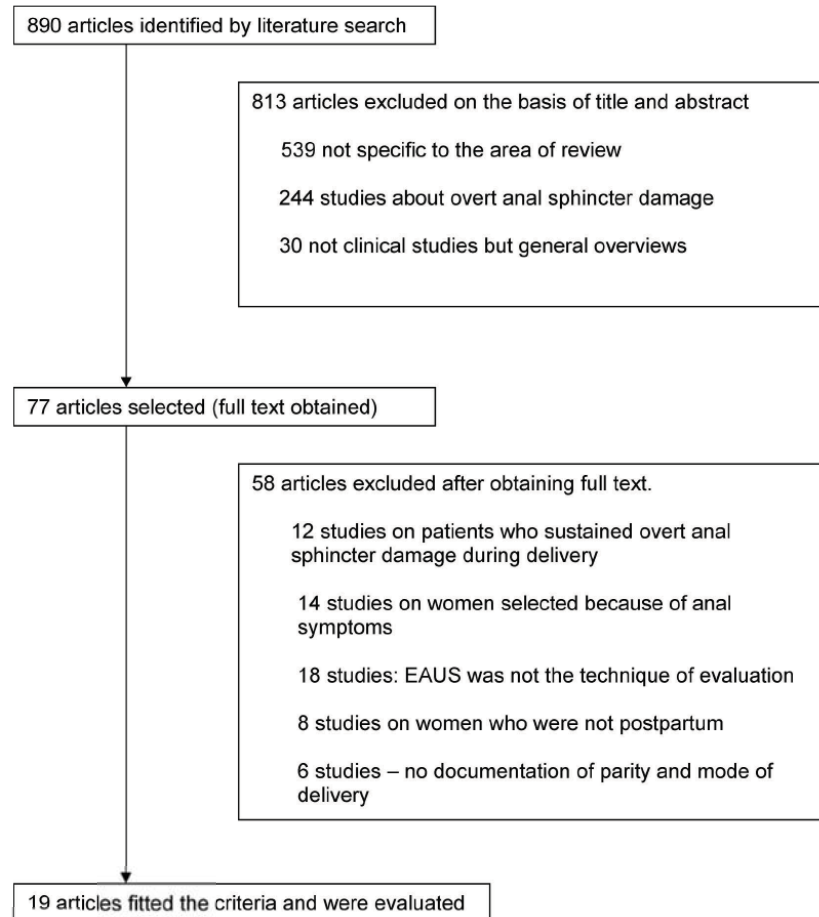
The prevalence of occult obstetric anal sphincter injury following childbirth—literature review

J. K. JOHNSON¹, S. W. LINDOW¹, & G. S. DUTHIE²

¹Department of Obstetrics and Gynaecology, Women and Children's Hospital – Hull Royal Infirmary, Hull, UK, and

²Academic Surgical Unit, Castle Hill Hospital, Cottingham, UK

The Journal of Maternal-Fetal and Neonatal Medicine, July 2007; 20(7): 547–554



Occult and sphincter damage in different categories.

Category	Number of studies	Sphincter damage/ number studied	Mean prevalence (%)	95% Confidence Interval (CI)
Primiparae (Unselected vaginal delivery)	13	288/983	29.2	28.4–30.0
Primiparae (Unassisted vaginal delivery)	6	74/341	21.7	20.3–23.1
Multiparae (Unselected vaginal delivery)	6	107/331	32.3	30.0–34.6
Forceps	11	131/267	49.1	45.5–52.8
Ventouse	7	66/146	45.2	41.9–48.2
Cesarean	10	1/173	0.6	0.4–0.8

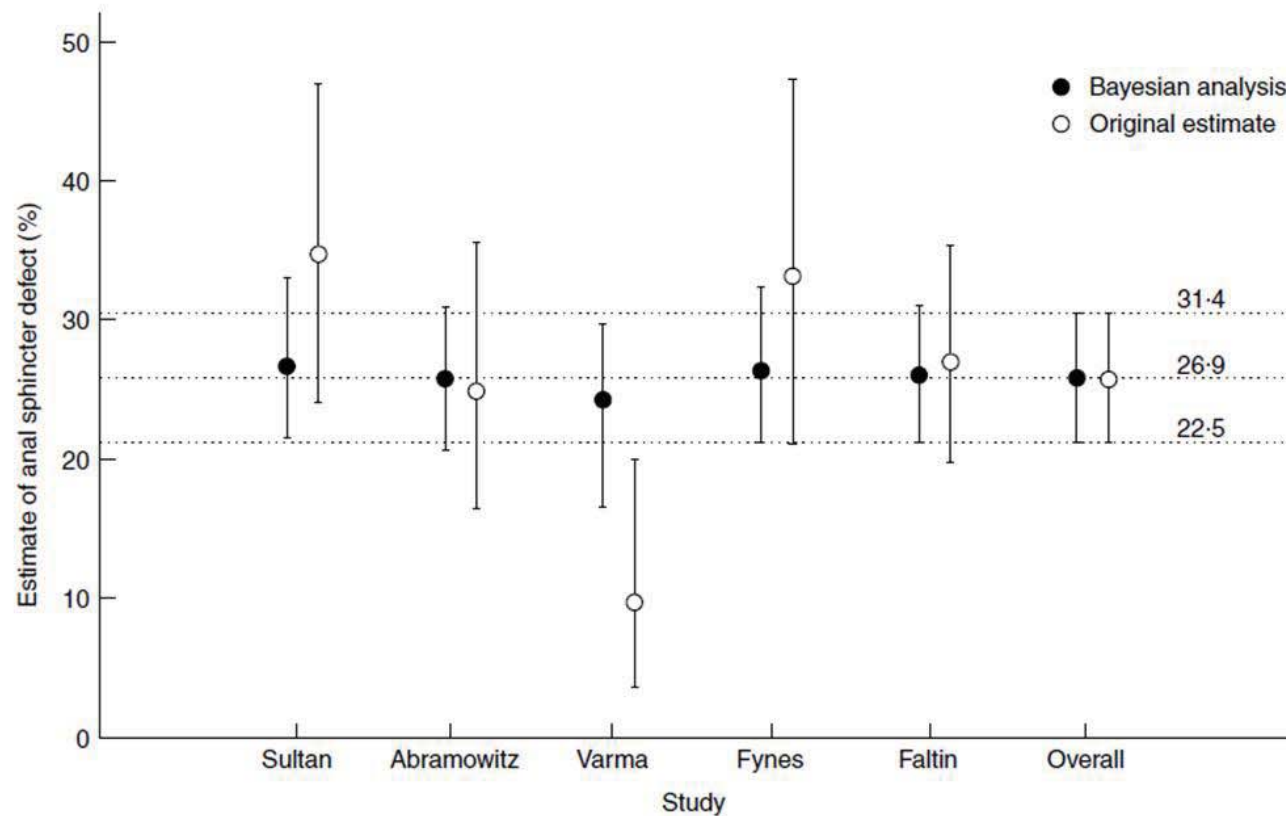


Meta-analysis to determine the incidence of obstetric anal sphincter damage

M. Oberwalder¹, J. Connor² and S. D. Wexner¹

¹Department of Colorectal Surgery, Cleveland Clinic Florida, Weston and Naples, Florida and ²Department of Biostatistics and Epidemiology, Cleveland Clinic Foundation, Cleveland, Ohio, USA

British Journal of Surgery 2003; **90**: 1333–1337

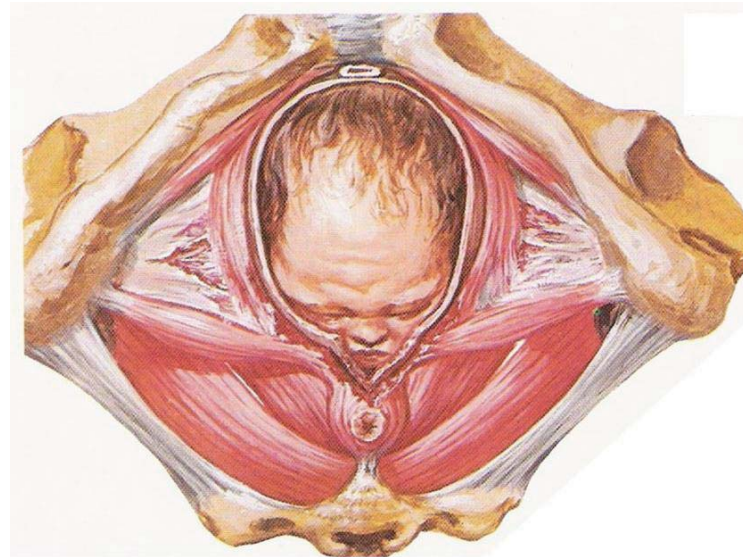


Percentage of primiparous women with anal sphincter defects diagnosed by endoanal ultrasonography in the five studies and overall. Values are estimates with 95 per cent confidence intervals



Obstetric Anal Sphincter Injury (OASI): Management

Shimon Ginath, MD



Treatment

- Repair as soon as possible
- Delayed repair may be associated with edema, infection, or hemorrhage
- All anal sphincter tears should be repaired in the operating theatre
 - Sterile environment
 - Better light
 - Access to appropriate surgical instruments
 - Use of diathermy



Treatment

- Repair should be performed by specifically trained and experienced Physician
- Experienced assistance recommended !
- Anesthesia:
 - Regional or general for optimal relaxation
- Antibiotics:
 - IV - Intraoperative (Cefuroxime + Metronidazole)
 - PO - 1w

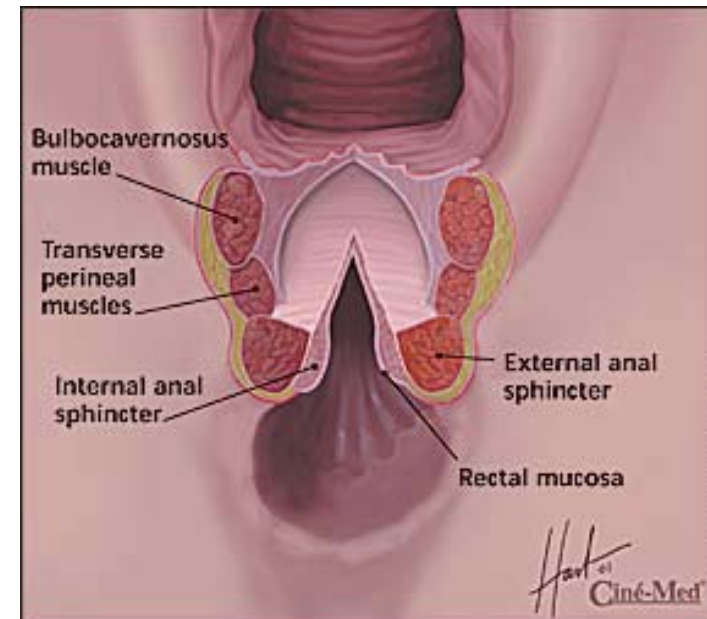


FIGURE 4.15. Political interaction between the obstetrician (MRCOG) and the surgeon (FRCS) regarding the “bottom line”.

Suture

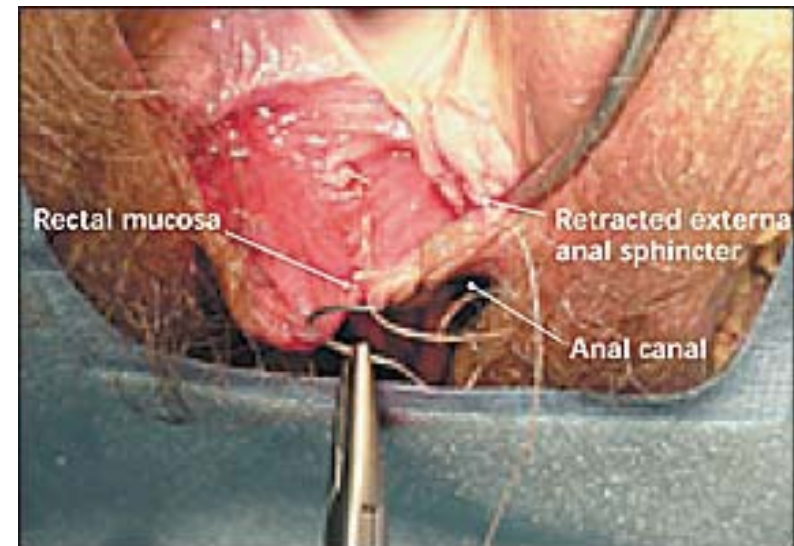
■ Repair of a 4th ° laceration requires approximation of:

- Rectal mucosa
- Internal anal sphincter (IAS)
- External anal sphincter (EAS)



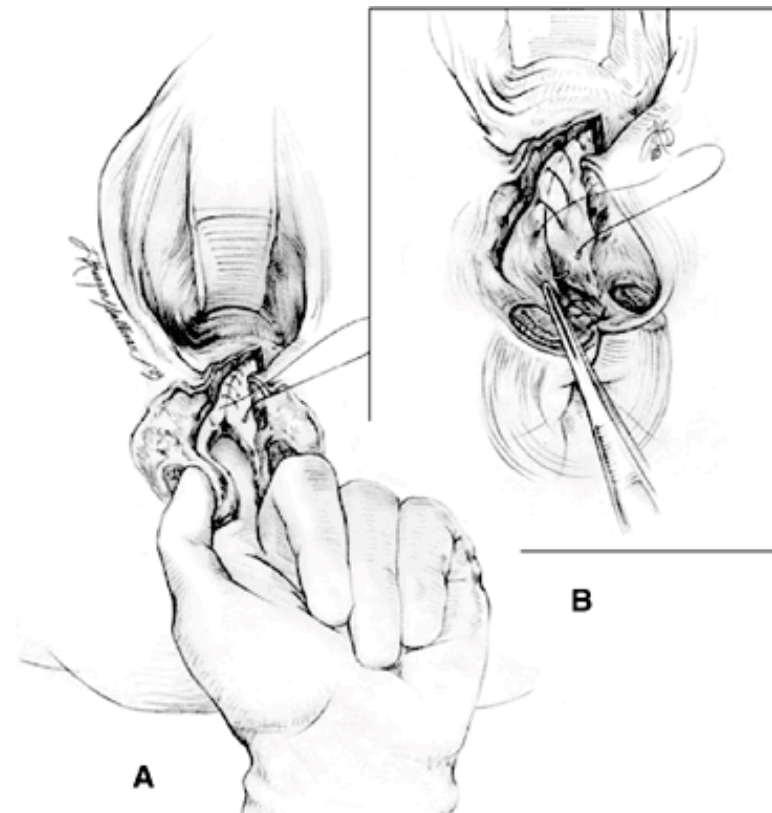
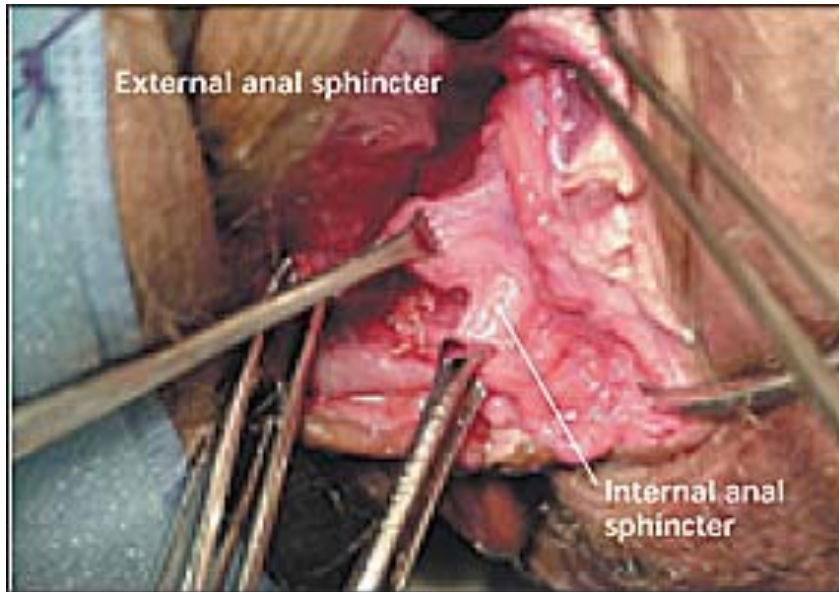
Rectal Mucosa

- Continuous / Interrupted sutures
- Vacryl 3-0



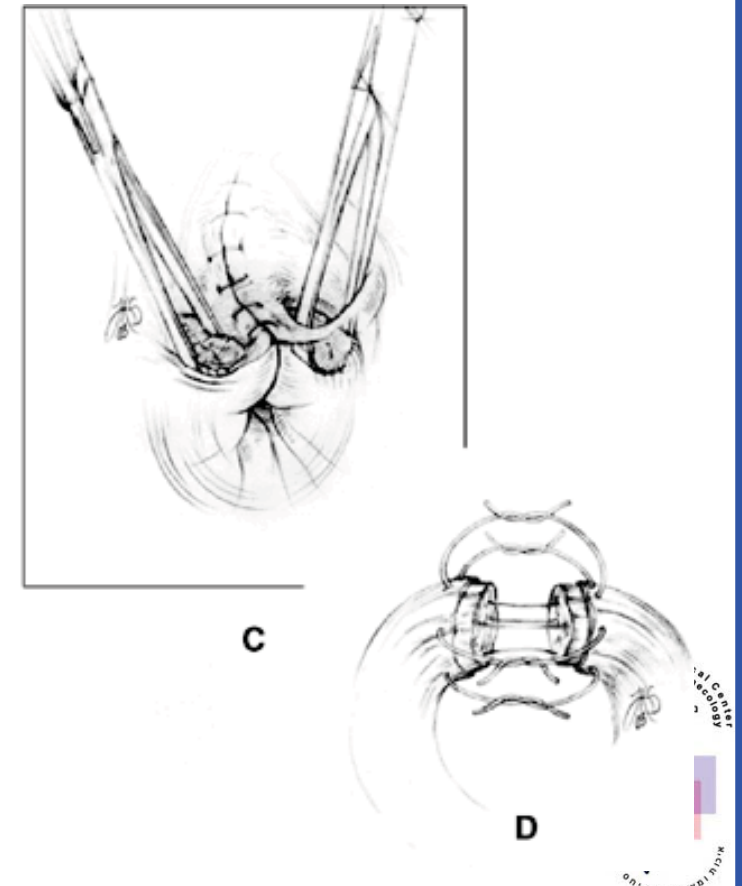
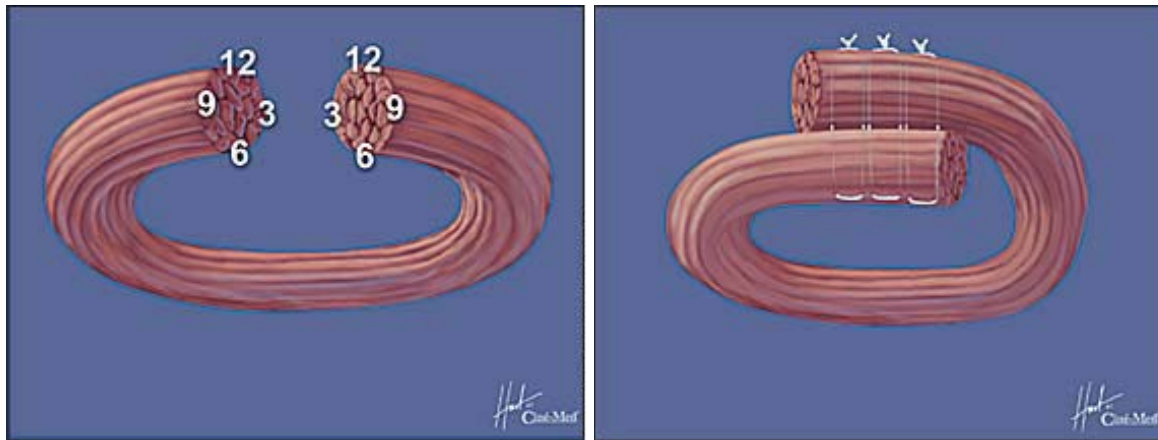
Internal anal sphincter (IAS)

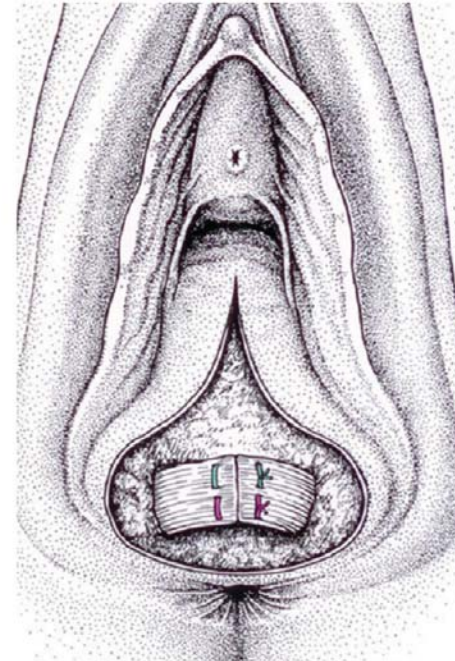
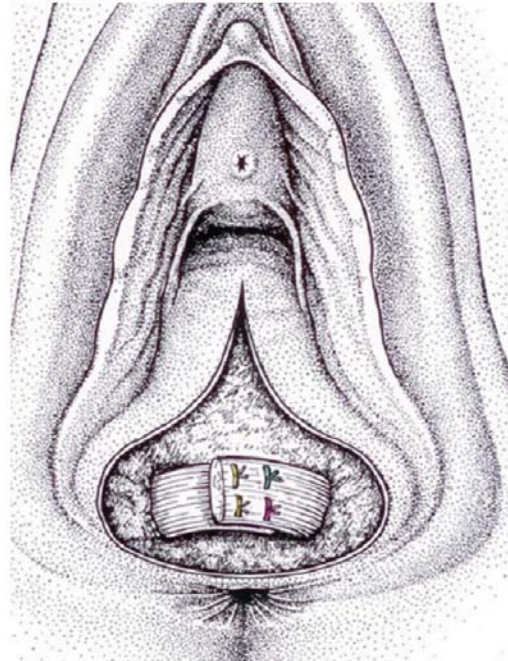
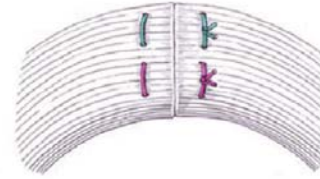
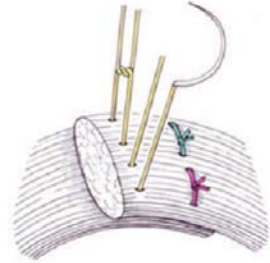
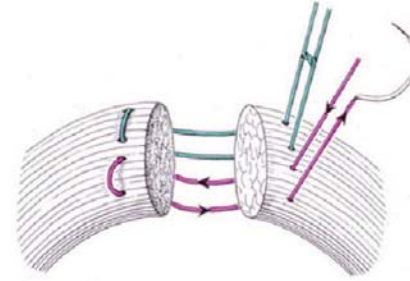
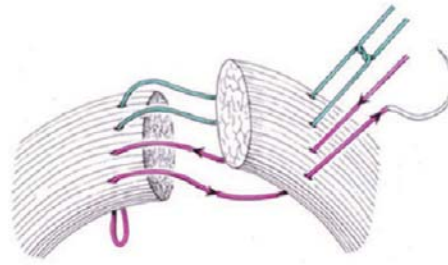
- IAS is responsible for the majority of the resting anal tone
- PDS 3-0



External anal sphincter (EAS)

- Disrupted ends of the striated EAS muscle and capsule are identified and grasped with clamps
- Suture:
 - End-to-end technique
 - Overlapping repair





Methods of repair for obstetric anal sphincter injury (Review)

Fernando R, Sultan AH, Kettle C, Thakar R, Radley S



THE COCHRANE
COLLABORATION®

This record should be cited as:

Fernando R, Sultan AH, Kettle C, Thakar R, Radley S. Methods of repair for obstetric anal sphincter injury. *Cochrane Database of Systematic Reviews* 2006, Issue 3. Art. No.: CD002866. DOI: 10.1002/14651858.CD002866.pub2.

- **3 RCTs, (n=279)** (*Fernando 2005, Fitzpatrick 2000, Williams 2006*)
- **Overlap & End-to-end repair of EAS - immediately after OASIs**
- **F/U: 12m**
- **No difference: Perineal pain, Dyspareunia, Flatus/Fecal incontinence, QOL**
- **Overlap technique:**
 - ↓ fecal urgency, ↓ anal incontinence score
 - ↓ deterioration of anal incontinence symptoms (12m)



			Patients		Parity	EAS tear	Suture type	F/U
			Overlap	End to end				
<i>Fitzpatrick et al</i>	2000	<i>Ireland</i>	55	57	NP	3a, 3b, 3c, 4	2-0 Polyglyconate	3m
<i>Garcia et al</i>	2005	<i>Mexico</i>	18	23	NP + MP	3c, 4	2-0 Polydioxanone	3m
<i>Williams et al</i>	2006	<i>UK</i>	28	28	NP + MP	3a, 3b, 3c, 4	3-0 Polydioxanone	3m
<i>Fernando et al</i>	2006	<i>UK</i>	32	32	NP + MP	3b, 3c, 4	3-0 Polydioxanone	12m
<i>Rygh & Korner</i>	2010	<i>Norway</i>	59	60	NP + MP	3b, 3c, 4	3-0 Polydioxanone	12m
<i>Farrell et al</i>	2010	<i>Canada</i>	61	62	NP	3b, 3c, 4	3-0 Polyglyconate	6m

NP = nulliparous, MP = multiparous

3a: <50% EAS thickness torn

3b: >50% EAS thickness torn

3c: both EAS and IAS torn

4: EAS, IAS and anal epithelium torn



		F/U	Perineal Pain ± Dyspareunia		<i>p</i>	Fecal Frequency		<i>p</i>
			Overlap	End to end		Overlap	End to end	
<i>Fitzpatrick et al</i>	2000	3m	26/55 (47%)	36/57 (63%)	0.13	11/55 (20%)	17/57 (30%)	0.32
<i>Garcia et al</i>	2005	3m	-	-		-	-	
<i>Williams et al</i>	2006	3m	10/22 (45%)	4/22 (18%)	0.106	-	-	
<i>Fernando et al</i>	2006	12m	2/29 (7%)	8/25 (20%)	0.03	1/27 (4%)	8/25 (32%)	0.02
<i>Rygh & Korner</i>	2010	12m	17/49 (35%)	22/50 (44%)	0.41	-	-	
<i>Farrell et al</i>	2010	6m	-	-		-	-	

		F/U	Flatus Incontinence		<i>p</i>	Anal Incontinence		<i>p</i>
			Overlap	End to end		Overlap	End to end	
<i>Fitzpatrick et al</i>	2000	3m	-	-		27/55 (49%)	33/57 (58%)	0.46
<i>Garcia et al</i>	2005	3m	3/11 (27%)	4/15 (27%)	1.0	6/11 (55%)	5/15 (33%)	0.43
<i>Williams et al</i>	2006	3m	-	-		8/20 (38%)	7/22 (32%)	0.75
<i>Fernando et al</i>	2006	12m	4/29 (14%)	4/25 (16%)	1.0	0/29	6/25 (24%)	0.009
<i>Rygh & Korner</i>	2010	12m	10/50 (20%)	14/51 (27%)	0.48	0/50	3/51 (5%)	0.23
<i>Farrell et al</i>	2010	6m	23/37 (61%)	9/24 (39%)	0.015	9 (15%)	5 (8%)	0.24



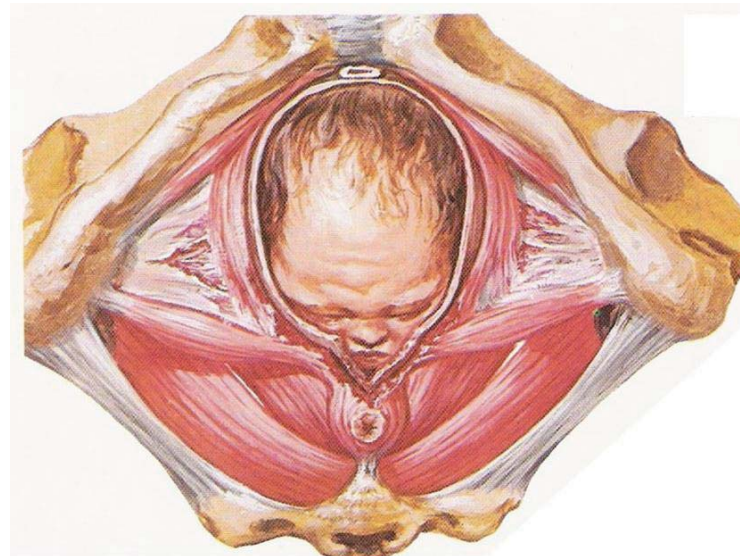
		F/U	US – EAS Defect		<i>p</i>	US – IAS Defect		<i>p</i>
			Overlap	End to end		Overlap	End to end	
<i>Fitzpatrick et al</i>	2000	3m	34/49 (69%)	40/53 (75%)	0.64	-	-	
<i>Garcia et al</i>	2005	3m	1/11 (9%)	3/15 (20%)	0.61	0/11	4/15 (27%)	0.11
<i>Williams et al</i>	2006	3m	3/22 (14%)	4/22 (18%)	1.0	0/22	0/22	1.0
<i>Fernando et al</i>	2006	12m	-	-		-	-	
<i>Rygh & Korner</i>	2010	12m	0/41	2/46 (4%)	1.0	-	-	
<i>Farrell et al</i>	2010	6m	23/37 (62%)	18/34 (53%)	0.47	14/37 (38%)	16/34 (47%)	0.47



Obstetric Anal Sphincter Injury (OASI)

Follow-up

Shimon Ginath, MD



Questions:

- What are the consequences of OASIS?
- How, when and by whom should OASIS patients be seen for F/U?
- What are the implications of OASIS regarding future deliveries?



AI - Definition

■ 1995 - Royal College of Physicians

“Involuntary or inappropriate passage of feces”

- Clear
- No mention of urgency or flatus incontinence
- No address the effect that the symptoms may have on the woman

■ 2002 - International Continence Society

“Involuntary loss of flatus, liquid or solid stool that is a social or hygienic problem”

- Include incontinence of flatus
- Acknowledge that different women may react in very different ways to what appear to be the same symptoms

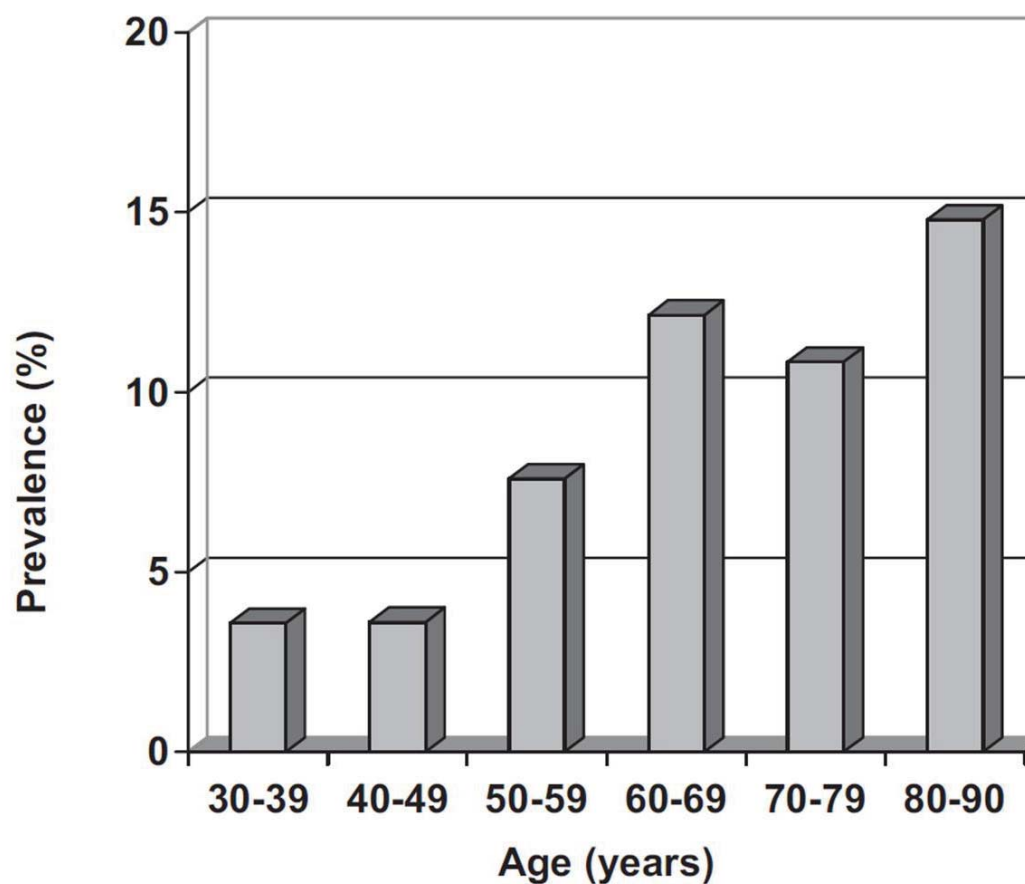


Anal Incontinence: Relationship to Pregnancy, Vaginal Delivery, and Cesarean Section

Dee Fenner, MD

Department of Obstetrics and Gynecology, University of Michigan

Semin Perinatol 30:261-266 © 2006



Prevalence of fecal incontinence by decade of age



A systematic review of etiological factors for postpartum fecal incontinence

ESTHER M.J. BOLLS^{1,2}, ERIK J.M. HENDRIKS^{1,2}, BARY C.M. BERGHMANS³,
COR G.M.I. BAETEN⁴, JAN G. NIJHUIS⁵ & ROB A. DE BIE^{1,2}

Acta Obstetrica et Gynecologica. 2010; 89: 302–314

¹Department of Epidemiology, Maastricht University/CAPHRI School for Public Health and Primary Care, Maastricht, The Netherlands, ²Centre for Evidence Based Physiotherapy, Maastricht University, Maastricht, The Netherlands, ³Pelvic care Center Maastricht, University Hospital Maastricht, Maastricht, The Netherlands, ⁴Department of Surgery, University Hospital Maastricht, Maastricht, The Netherlands, and ⁵Department of Obstetrics and Gynecology, University Hospital Maastricht, Maastricht, AZ, The Netherlands

- 3rd or 4th degree sphincter rupture was the only etiological factor associated with postpartum FI
- No association with other postulated risk factors was found: age, instrumental delivery, birth weight, prolonged labor, epidural anesthesia, episiotomy



Obstetric anal sphincter injury in the UK and its effect on bowel, bladder and sexual function

Marsh Fiona^{a,*}, Rogerson Lynne^a, Landon Christine^a, Wright Alison^b

^aDepartment of Urogynaecology, Level 2, Chancellor Wing, St. James's University Hospital, Beckett Street, Leeds LS9 7TF, United Kingdom

^bDepartment of Obstetrics and Gynaecology, Royal Free Hospital, Pond Street, London NW3 2QG, United Kingdom

European Journal of Obstetrics & Gynecology and Reproductive Biology 154 (2011) 223–227

- 5y period (2004 – 2009)
- 435 women – OASI
- F/U up to 3 m postpartum

Faecal symptoms following oais.

Faecal incontinence

Yes	3.7% (15)
No	96.3% (392)

Faecal urgency

Frequently	7.4% (28)
Sometimes	26.8% (101)
Never	65.8% (248)

Control of flatus

Good	75.2% (306)
Variable	20.1% (82)
Poor	4.7% (19)

Pain on defaecation

None	70.9% (258)
Anal	24.7% (90)
Abdominal	4.4% (16)



The prevalence of anal incontinence in post-partum women following obstetrical anal sphincter injury

Rainbow Y. T. Tin • Jane Schulz • Beth Gunn •
Cathy Flood • Rhonda J. Rosychuk

Department of Obstetrics and Gynecology, University of Alberta,
Edmonton, Canada

Int Urogynecol J (2010) 21:927–932

■ OASI, 2000 – 2005

■ Survey response rate $^{325}/_{1,383}$ (25%)

■ Pelvic Floor Distress Inventory (PFDI-20)

■ Pelvic Floor Impact Questionnaire (PFIQ-7)

Colorectal Anal Distress Inventory (CRADI)	<i>n</i>	Percentage	95% CI (%)
Strained bowel movement	138	42.5	37.1-48
Incomplete bowel emptying	141	43.4	38-49
Solid stool incontinence	25	7.7	5.1-11.3
Loose stool incontinence	64	19.7	15.6-24.5
Flatus incontinence	124	38.2	32.9-43.7
Pain when passing stool	78	24	19.5-29.1
Bowel movement urgency	129	39.7	34.4-45.3
Rectal mucosal prolapse	34	10.5	7.5-14.4

Assessment of the Predictive Value of a Bowel Symptom Questionnaire in Identifying Perianal and Anal Sphincter Trauma After Vaginal Delivery

Andrea Frudinger, M.D.,*†§ Steve Halligan, M.D., M.R.C.P., F.R.C.R.,*
Clive I. Bartram, F.R.C.P., F.R.C.R., F.R.C.S.,* John Spencer, B.Sc., F.R.C.O.G.,‡
Michael A. Kamm, M.D., F.R.C.P., F.R.A.C.P.,† Raimund Winter, M.D.§

From the *Intestinal Imaging Centre, †Physiology Unit, ‡Department of Obstetrics and Gynaecology, Northwick Park and St. Mark's Hospitals, Northwick Park, London, United Kingdom, and §Department of Obstetrics and Gynaecology, University Graz, Graz, Austria

Dis Colon Rectum 2003;46:742-747

The Natural History of Clinically Unrecognized Anal Sphincter Tears Over 10 Years After First Vaginal Delivery

Andrea Frudinger, MD, Martina Ballon, MD, Stuart A. Taylor, MRCP, FRCR,
and Steve Halligan, FRCP, FRCR

From the Department of Obstetrics and Gynaecology, Medical University of Graz, Graz, Austria; and Department of Specialist Radiology, University College Hospital and University College London (UCLH/UCL), London, United Kingdom.

Obstet Gynecol 2008;111:1058-64

- 134 PP, VD, No clinical evidence of a 3rd degree tear
- AI questionnaire + anal US before (3rd tr.) and after (3-8m) delivery
- After delivery:
 - Anal continence deteriorated: 37/134 (27.6%)
 - Evidence of sonographic trauma (EAS): 14/134 (10.4%) → No AI deterioration: 6/97 (6.2%)
→ AI deterioration: 8/37 (21.6%) p=0.02

Effect of a Sphincter Tear Upon Change in Anal Continence Score From Baseline to 10 Years in 107 Women

Group	Unadjusted		Adjusted	
	Effect (95% CI)	P	Effect (95% CI)	P
All women	0.1 (-1.0 to 1.2)	.87	0.3 (-0.9 to 1.6)	.61
No deterioration	-1.1 (-2.4 to 0.2)	.09	-1.5 (-3.1 to 0.1)	.07
Deterioration	2.1 (0.3 to 3.8)	.02	2.8 (0.9 to 4.7)	.005



Ultrasonographic anal sphincter defects w/o postpartum incontinence **not** associated with deterioration in continence over the following decade



Obstetrical anal sphincter laceration and anal incontinence 5-10 years after childbirth

Emily C. Evers, MPH; Joan L. Blomquist, MD; Kelly C. McDermott, BS; Victoria L. Handa, MD, MHS

Department of Gynecology and Obstetrics, Johns Hopkins School of Medicine

Department of Obstetrics and Gynecology, Greater Baltimore Medical Center

Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health Baltimore, MD.

Am J Obstet Gynecol 2012;207:425.e1-6

- **5-10 y after 1st delivery**
- **Anal incontinence, QOL:** - EPIC = Epidemiology of Prolapse and Incontinence Questionnaire
- CAIQ7 = Colorectal Anal Impact Questionnaire
- **90 women: at least 1 anal sphincter laceration**
- **320 women: VD without sphincter laceration**
- **527 women: CS**
- **Women with anal sphincter laceration reported:**
 - **Anal incontinence (OR, 2.32; 95% CI, 1.27-4.26)**
 - **Negative impact on QOL: Exercise, Entertainment & social activities, travel >30min**



Complete rupture of anal sphincter in primiparas: long-term effects and subsequent delivery

GISELA WEGNELIUS¹ & MARGARETA HAMMARSTRÖM²

¹Södersjukhuset, Division of Obstetrics and Gynecology, Stockholm, Sweden, and ²Karolinska Institute, Department of Clinical Science and Education, Södersjukhuset, Section of Obstetrics and Gynecology, Stockholm, Sweden

Acta Obstetrica et Gynecologica Scandinavica **90** (2011) 258–263

■ 1991 – 1994

■ 134 PP, 29.5y (20–40)

■ OASI grade 3c /4

■ end-to-end

	AI		No AI
	↓		↓
3-4m	31% ⁴¹ / ₁₃₄		69% ⁹³ / ₁₃₄
	↓		↓
3-8y	78% ²⁹ / ₃₇	43% ³⁷ / ₈₆	57% ⁴⁹ / ₈₆



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Reported complaints when answering the questionnaire 3–8 years after the first delivery.

Case group (complete ruptures grade 3c and 4) compared to control groups.

	Case group, <i>n</i> = 125		Cesarean group, <i>n</i> = 121		Normal delivery group, <i>n</i> = 211		<i>p</i> -value
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Anal incontinence	67	54	25	21	48	23	
Cases vs. cesarean OR (95% CI)	3.72 (2.07–6.90)						<0.0001
Cases vs. normal delivery OR (95% CI)	3.34 (2.02–5.62)						<0.0001



Outcomes and follow-up after obstetric anal sphincter injuries

K. Ramalingam • A. K. Monga

Kingston Hospital NHS trust, Galsworthy Road, Kingston, Surrey KT2 7QB, UK

Princess Anne Hospital, University of Southampton Hospital, Southampton, UK

Int Urogynecol J (2013) 24:1495–1500

Type of tear	Total (n=255)	6m F/U (n=175)	Any Symptom	
3a	132	92	8	8.7%
3b	81	56	7	12.5%
3c	27	18	3	16.7%
4	15	9	5	55.6%

Severity of the tear and the symptoms at follow-up

Type of tear	Any symptom	Urgency	Flatus	Liquid	Solid
3a	8	7	1	0	0
3b	7	3	0	3	1
3c	3	0	1	1	1
4	5	1	2	2	0

53%



Obstetric Anal Sphincter Injury

Incidence, Risk Factors, and Management

Thomas C. Dudding, MRCS, Carolynne J. Vaizey, MD, FRCS, FCS(SA),
and Michael A. Kamm, MD, FRCP, FRACP

Ann Surg 2008;247: 224–237

Physiology Unit, St. Mark's Hospital, London

- **~44% of women after VD – new symptoms of alterations in bowel continence**
(Fecal urgency, Flatus incontinence, Soiling, Solid fecal incontinence)
- **Damage to anal sphincters – common, but under diagnosed at the time of delivery**
- **$\frac{1}{3}$ - $\frac{2}{3}$ with recognized 3rd degree tear during VD → fecal incontinence**
- **In women with symptoms of postpartum / late onset fecal incontinence → ↑ sphincter injury rate: EAS – 90%, IAS – 65%**
- **True incidence of persistent incontinence to solid stool ~ 3%**



Follow-up after OASIS

- Specialized perineal clinic
- Multidisciplinary:
 - Urogynecologist
 - Colorectal surgeon
 - Gastroenterologist
 - Pelvic floor physiotherapist
- Goal: identify symptoms, early intervention



Follow-up after OASIS

■ Immediate

■ After delivery:

- Antibiotics
- Stool softeners

■ Before discharge :

- R/O hematoma or infection
- Treat constipation and pain
- Explanation and counselling

■ 4 – 6 w after delivery

- Symptoms
- Wound healing
- Hematoma / Infection
- R/O fistula
- Investigate for symptoms
- Treat pain
- PFMT

■ 6 – 12 m after delivery

- TRUS
- Ano-rectal manometry
- Refer: Colorectal, PFMT, GE
- Counselling: mode of delivery during next pregnancy



		Repeat OASI		Risk Factors						
<i>Peleg D, 1999</i>	<i>(USA, Iowa)</i>	<i>58/774</i>	<i>(7.5%)</i>	VE	OF	ME				
<i>Payne TN, 1999</i>	<i>(USA, Oklahoma)</i>	<i>19/178</i>	<i>(10.7%)</i>	VE	OF	ME				
<i>Dandolu V, 2005</i>	<i>(USA, Philadelphia)</i>	<i>864/14,990</i>	<i>(5.8%)</i>	VE	OF	ME	Age			
<i>Edwards H, 2006</i>	<i>(USA, Philadelphia)</i>	<i>6/249</i>	<i>(2.4%)</i>	VE	OF	ME	Age			
<i>Lowder JI, 2007</i>	<i>(USA, Pittsburgh)</i>	<i>76/1,054</i>	<i>(7.2%)</i>			ME		LGA	OP	SD
<i>Harkin R, 2003</i>	<i>(Ireland)</i>	<i>2/45</i>	<i>(4.4%)</i>							
<i>Elfaghi I, 2004</i>	<i>(Sweden)</i>	<i>956/21,614</i>	<i>(4.4%)</i>				Age	4th		
<i>Spydslaug A, 2005</i>	<i>(Norway)</i>	<i>357/8,968</i>	<i>(4.0%)</i>	VE	OF		Age			Epid
<i>Scheer I, 2009</i>	<i>(UK)</i>	<i>3/41</i>	<i>(6.8%)</i>							
<i>Wegnelius G, 2011</i>	<i>(Sweden)</i>	<i>3/38</i>	<i>(7.9%)</i>							
<i>Baghestan E, 2012</i>	<i>(Norway)</i>	<i>750/13,305</i>	<i>(5.6%)</i>	VE	OF		Age	LGA		
<i>Jangö H, 2012</i>	<i>(Denmark)</i>	<i>521/7,336</i>	<i>(7.1%)</i>	VE	OF			LGA	4th	OP SD
<i>Yariv Y, 2013</i>	<i>(Israel)</i>	<i>4/166</i>	<i>(2.4%)</i>	VE	OF			LGA	4th	



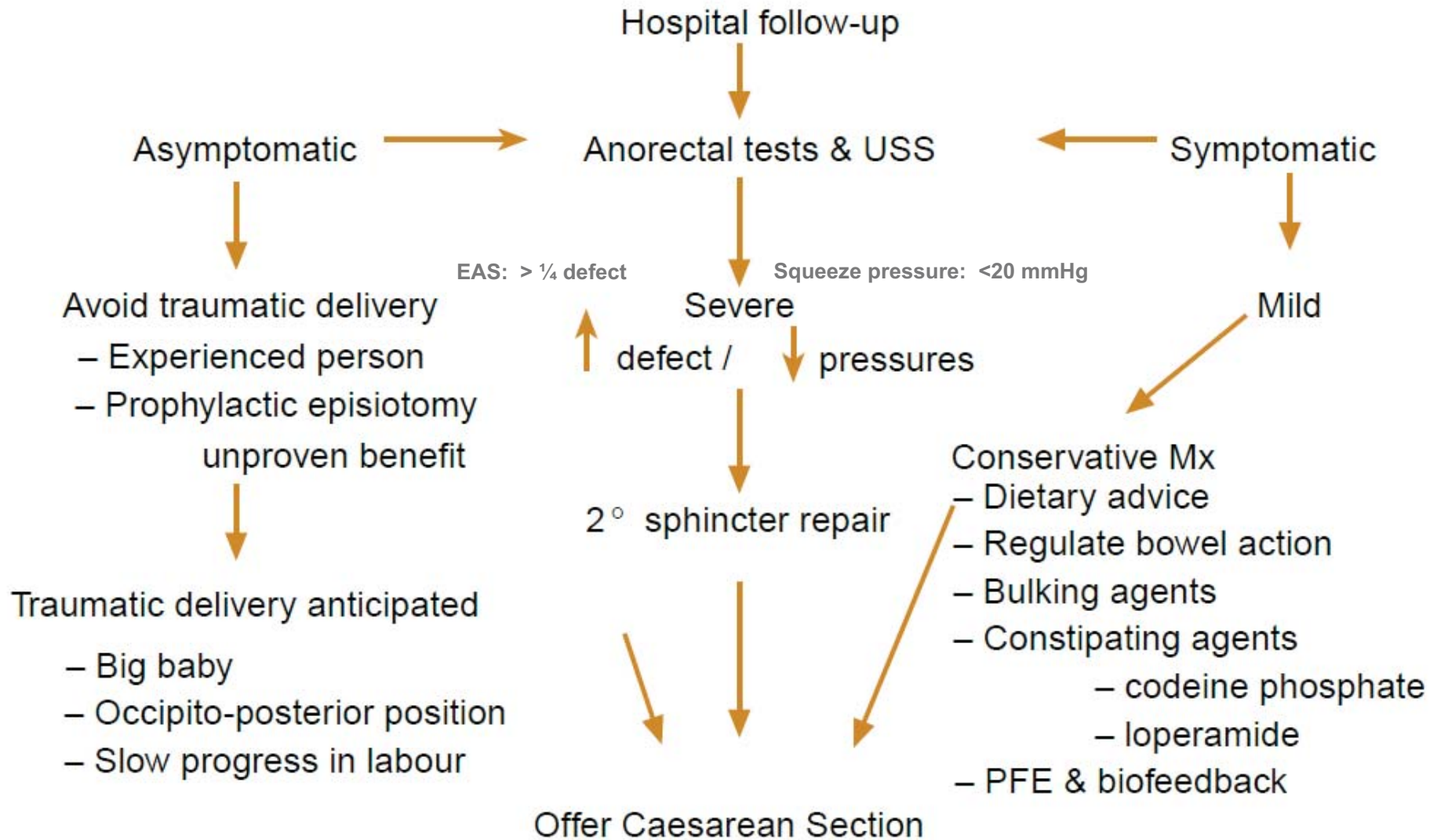
THE MANAGEMENT OF THIRD- AND FOURTH-DEGREE PERINEAL TEARS



Royal College of
Obstetricians and
Gynaecologists

Green-top Guideline No. 29

March 2007



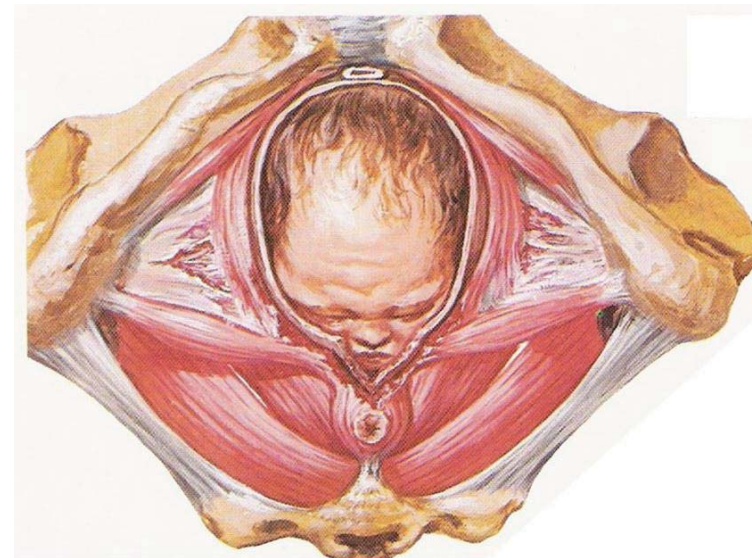
Obstetric Anal Sphincter Injury (OASI): Prevention

Shimon Ginath, MD

The Israeli Society
of Urogynecology
and Pelvic Floor



החברה הישראלית
לאורוגינקולוגיה
ורצפת האגן



Perineal techniques during the second stage of labour for reducing perineal trauma (Review)



THE COCHRANE
COLLABORATION®

Aasheim V, Nilsen ABV, Lukasse M, Reinar LM

Cochrane Database of Systematic Reviews 2011, Issue 12. Art. No.: CD006672

Comparison 1. Hands off (or poised) versus hands on

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 3 rd or 4 th degree tears	3	6617	Risk Ratio (M-H, Random, 95% CI)	0.73 [0.21, 2.56]
2 Episiotomy	2	6547	Risk Ratio (M-H, Random, 95% CI)	0.69 [0.50, 0.96]
3 Intact perineum	2	6547	Risk Ratio (M-H, Random, 95% CI)	1.03 [0.95, 1.12]

Comparison 2. Warm compresses versus control (hands off or no warm compress)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 3 rd or 4 th degree tears	2	1525	Risk Ratio (M-H, Random, 95% CI)	0.48 [0.28, 0.84]
2 Episiotomy	2	1525	Risk Ratio (M-H, Random, 95% CI)	0.93 [0.62, 1.39]
3 Intact perineum	2	1525	Risk Ratio (M-H, Random, 95% CI)	1.05 [0.86, 1.26]



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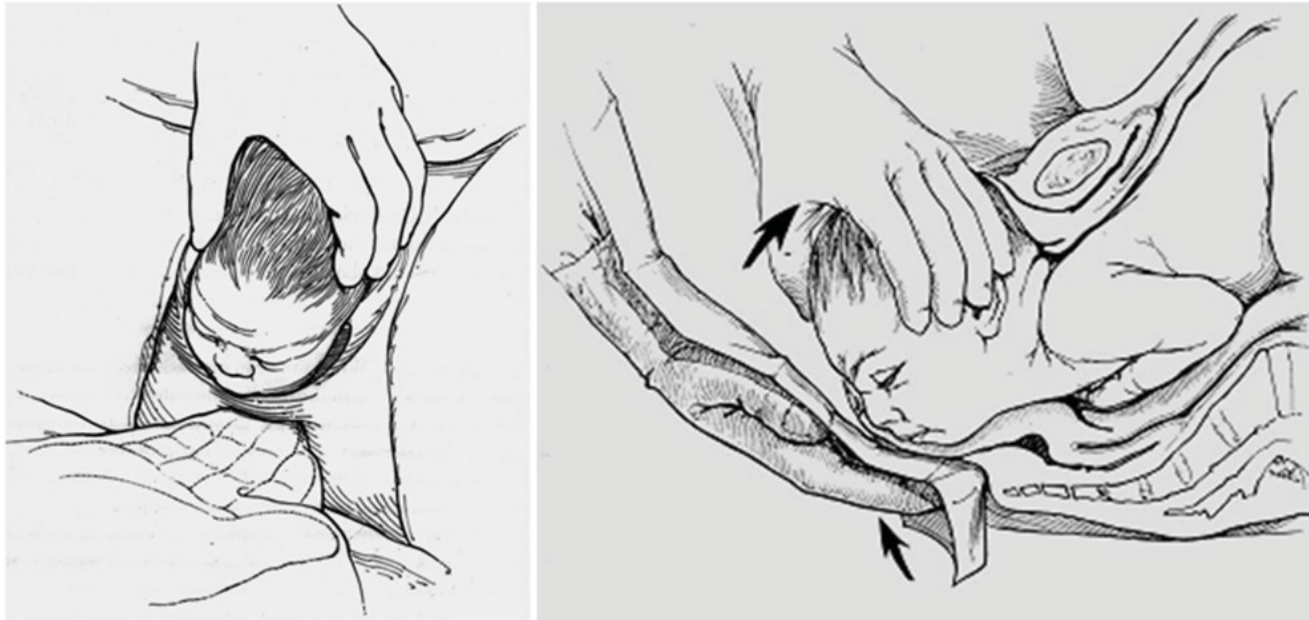
Comparison 3. Massage versus control (hands off or care as usual)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 3 rd or 4 th degree tears	2	2147	Risk Ratio (M-H, Random, 95% CI)	0.52 [0.29, 0.94]
2 Episiotomy	2	2147	Risk Ratio (M-H, Random, 95% CI)	1.42 [0.42, 4.87]
3 Intact perineum	2	2147	Risk Ratio (M-H, Random, 95% CI)	1.04 [0.90, 1.20]

Comparison 4. Ritgen's manoeuvre versus standard care

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 3 rd degree tears	1	1423	Risk Ratio (M-H, Random, 95% CI)	1.42 [0.86, 2.36]
2 4 th degree tears	1	1423	Risk Ratio (M-H, Random, 95% CI)	0.60 [0.18, 2.03]
3 3 rd or 4 th degree tears	1	1423	Risk Ratio (M-H, Random, 95% CI)	1.24 [0.78, 1.96]
4 Episiotomy	1	1423	Risk Ratio (M-H, Random, 95% CI)	0.81 [0.63, 1.03]





■ Ritgen's maneuver:

- Palpating the fetal chin through the perineum and applying pressure upward
- Originally performed through the rectum



Antenatal perineal massage for reducing perineal trauma



Michael M Beckmann¹, Owen M Stock²

¹Mater Health Services, Brisbane, Australia. ²Department of Obstetrics and Gynaecology, Mater Mothers' Hospital, Mater Health Services, Brisbane, Australia

Cochrane Database of Systematic Reviews 2013, Issue 4. Art. No.: CD005123.

- **4 trials (2497 women)**
- **Comparing digital perineal massage with control**
 - **Woman / partner**
 - **5-10 min perineal massage daily from 34 weeks**
 - **1-2 fingers introduced 3-4 cm in vagina**
 - **applying alternating downward and sideward pressure**
 - **using sweet almond oil**



Antenatal perineal massage for reducing perineal trauma



Michael M Beckmann¹, Owen M Stock²

¹Mater Health Services, Brisbane, Australia. ²Department of Obstetrics and Gynaecology, Mater Mothers' Hospital, Mater Health Services, Brisbane, Australia

Cochrane Database of Systematic Reviews 2013, Issue 4. Art. No.: CD005123.

■ Antenatal digital perineal massage was associated with:

- ↓ Trauma requiring suturing RR 0.91 (95% CI 0.86 to 0.96)
- ↓ Episiotomy RR 0.84 (95% CI 0.74 to 0.95)
- No differences in the incidence of: - 1st / 2nd degree perineal tears
- 3rd / 4th degree perineal trauma
- ↓ Pain at 3m postpartum RR 0.45 (95% CI 0.24 to 0.87)
- No differences in the incidence of: - Instrumental deliveries
- Sexual satisfaction
- Incontinence of urine, feces or flatus

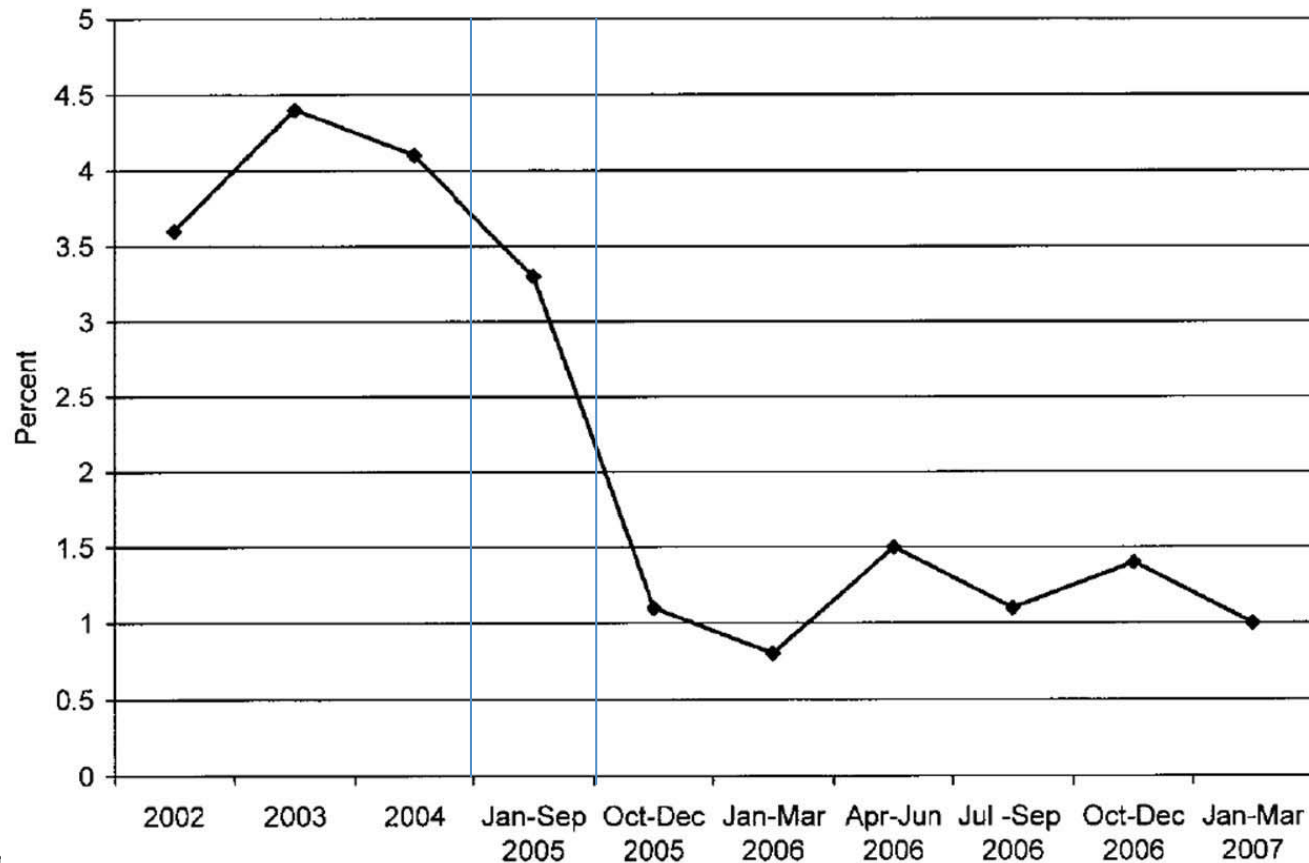


Decreasing the Incidence of Anal Sphincter Tears During Delivery

Katariina Laine, MD, Tiina Pirhonen, RN, Rune Rolland, MD, PhD, and Jouko Pirhonen, MD, PhD

Obstet Gynecol 2008;111:1053–7

From the Departments of Obstetrics and Gynecology, Oestfold Trust Hospital, Fredrikstad, Norway; and Ullevaal University Hospital, University of Oslo, Oslo, Norway.



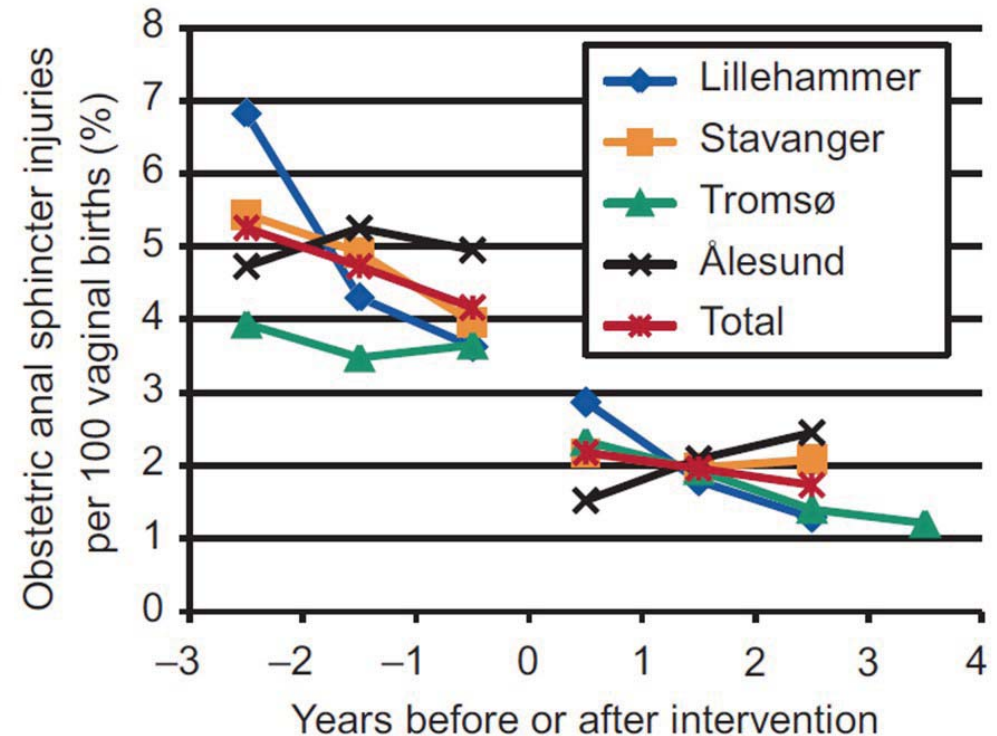
Frequency of anal sphincter ruptures in Fredrikstad from January 2002 to March 2007. The years 2002–2004 were before intervention, January to September 2005 was local effort, and October 2005 to March 2007 was the period for active intervention.

A Multicenter Interventional Program to Reduce the Incidence of Anal Sphincter Tears

Elisabeth Hals, RN, Pål Oian, MD, PhD, Tiina Pirhonen, RN, Mika Gissler, DrPhil, MSOGSCI, Sissel Hjelle, MD, Elisabeth Berge Nilsen, MD, Anne Mette Severinsen, RN, Cathrine Solstetten, RN, Tom Hartgill, MD, and Jouko Pirhonen, MD, PhD

Obstet Gynecol 2010;116:901–8

From the Department of Obstetrics and Gynecology, Innlandet Hospital Trust, Lillehammer, Norway; the Department of Obstetrics and Gynecology and Institute of Clinical Medicine, University Hospital of Northern Norway/University of Tromsø, Tromsø, Norway; The Norwegian Continence and Pelvic Floor Center, University Hospital of North Norway, Tromsø, Norway; the National Institute for Health and Welfare, Helsinki, Finland; the Nordic School of Public Health, Gothenburg, Sweden; and the Departments of Obstetrics and Gynecology, Ålesund Hospital, Ålesund, Norway; Stavanger University Hospital, Stavanger, Norway; and Oslo University Hospital, University of Oslo, Oslo Norway.



The proportion of obstetric anal sphincter injuries per 100 vaginal births before (1, 2, and 3 years) and after (1, 2, 3, and 4 years) intervention in four Norwegian hospitals.



- **Delivery position → visualization of perineum during last minutes of delivery**
- **Adequate perineal support**
 - **Lt. hand:** presses baby's head to control the speed of crowning through vaginal introitus
 - **Rt. hand:** - thumb and index finger support the perineum
 - flexed middle finger used to grip baby's chin
- **Good communication (Woman asked to stop pushing and to breathe rapidly)**
- **Episiotomy only on indication**



Episiotomy

- Episiotomy is one of the most common operations performed in women

Oliphant SS et al, Obstet Gynecol 2010

- Episiotomy was traditionally considered to protect the perineum from uncontrolled injury during delivery by increasing the diameter of the soft tissue pelvic outlet

ACOG Practice Bulletin, Episiotomy, 2006

Frankman EA et al, Am J Obstet Gynecol, 2009



Episiotomy Rates / An Uj

Ian D. Graham, PhD, Guillermo Carr
Jennifer Mary M

BIRTH 32:3 S

Clinical Epidemiology Program, U

Table 1. Selected Episiotomy Rates Per 100 Vaginal Deliveries by Region and Country, 1995–2003

Region	Country/Reference	Year	Primiparas %	Total %
North America	Canada (19)	2000–2001		23.8
	United States (18)	2000		32.7
Central and South America	Argentina (38)	1996	65.3	28.5
	Mexico (17)	1995–1998	69.2	
	Panama (17)	1995–1998	81.8	
	Colombia (17)	1995–1998	86.2	
	Nicaragua (17)	1995–1998	86.3	
	Bolivia (17)	1995–1998	90.8	
	Paraguay (17)	1995–1998	91.5	
	Honduras (17)	1995–1998	92	
	Brazil (17)	1995–1998	94.2	
	Peru (17)	1995–1998	94.4	
	Dominican Republic (17)	1995–1998	94.9	
	Uruguay (17)	1995–1998	95.1	
	Chile (17)	1995–1998	95.9	
	Ecuador (17)	1995–1998	96.2	
	Guatemala (12)	2001	100 (estimate)	
Northern Europe	Sweden (39)	1999–2000		9.7
	Denmark (40)	2002–2003		12
	Finland (41)	2003		33.9
Western Europe	England (42)	2002–2003		13
	Scotland (40)	2002–2003		16.3
	Netherlands (43)	1995		24.5
	Germany (40)	2002–2003		44.4
	Switzerland (44)	2004		46
	Ireland (39)	1999–2000		46
	France (40)	2002–2003		49.5
	Italy (39)	1999		58
	Turkey (45)	1999–2000		64
	Spain (46)	1995		87.3
Eastern Europe	Bulgaria (47,48)	1997	77.1	45.6
	St. Petersburg, Russia (49)	1997		46.2
Asia	Nepal (50)	2003		42.9–67.3
	China (26)	2001		82
	Taiwan (32)	2002		100 (estimate)
Middle East	Israel (51)	2001		37.6
Oceania	New Zealand (52)	2001		11
	Australia (20)	2002		16.2
Africa	Burkina Faso (53)	1998	37	14
	Nigeria (54,55)	2001	90	20
	Botswana (56)	1998–2000		20.7
	Zimbabwe (57)	1997–1998	54	27
	South Africa (58)	2003		63.3–67.5



Trends Over Time With Commonly Performed Obstetric and Gynecologic Inpatient Procedures

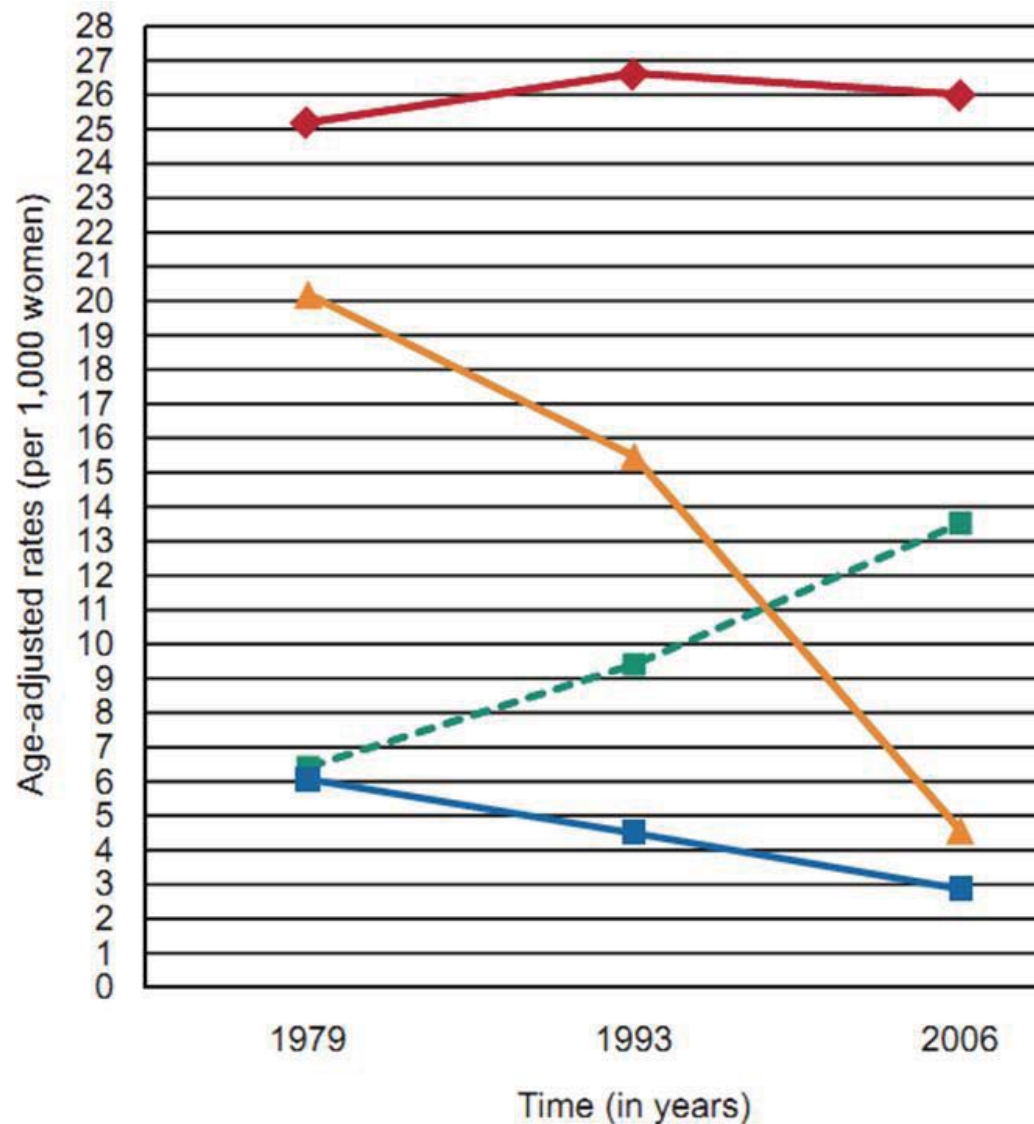
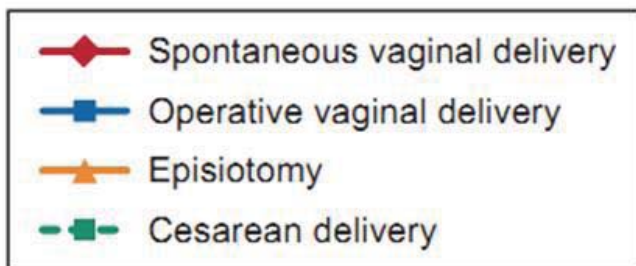
Sallie S. Oliphant, MD, Keisha A. Jones, MD, Li Wang, MS, Clareann H. Bunker, PhD, and Jerry L. Lowder, MD, MS

From the Division of Urogynecology, Department of Obstetrics, Gynecology, and Reproductive Sciences, Magee-Womens Hospital, University of Pittsburgh School of Medicine, Pittsburgh, Pennsylvania; Office of Clinical Research, University of Pittsburgh Clinical and Translational Science Institute, Pittsburgh, Pennsylvania.

Obstet Gynecol 2010;116:926-31

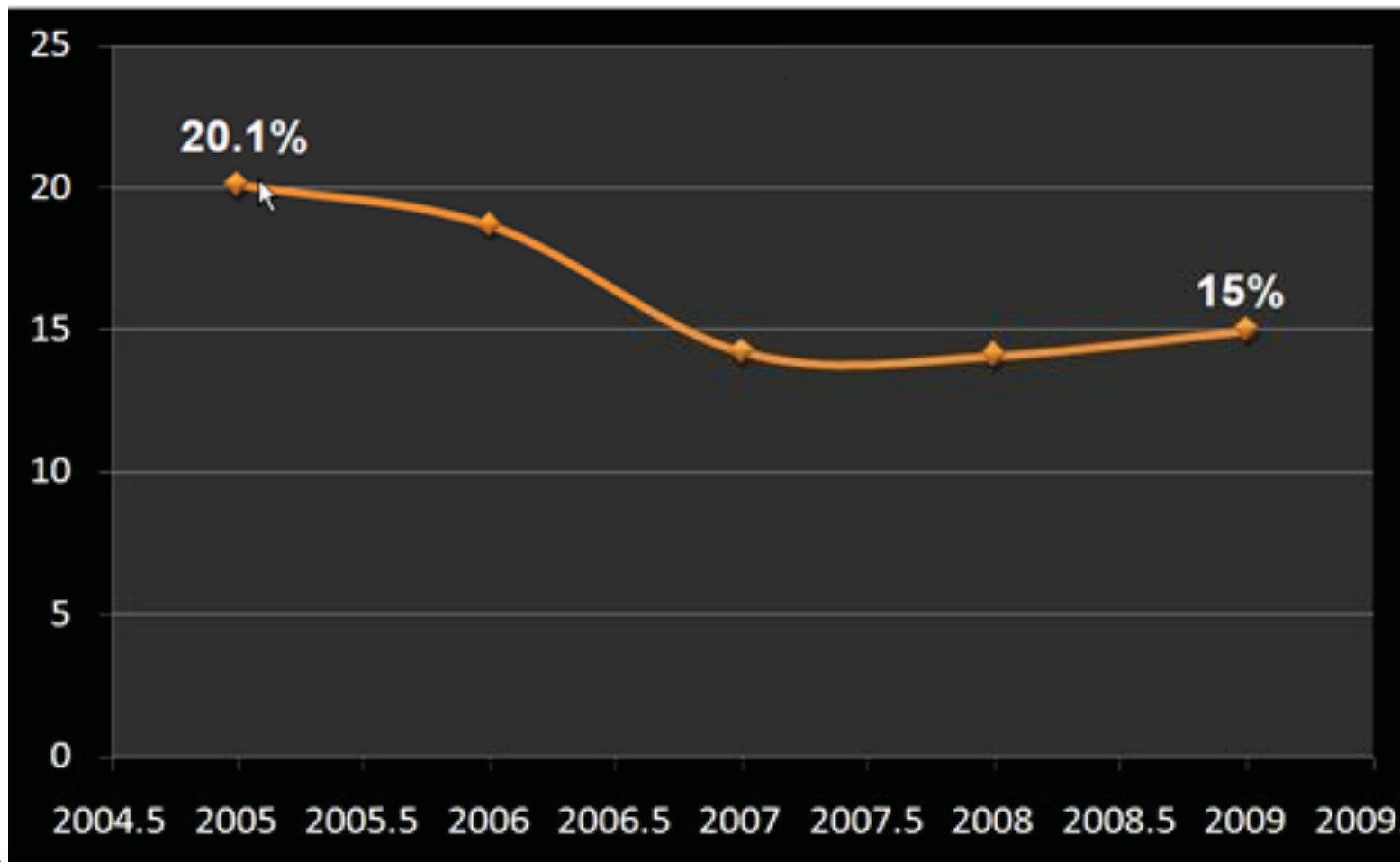
- Procedures in adult women (1979 - 2006)
- National Hospital Discharge Survey
- Federal discharge dataset of inpatient hospitals
- ICD-9

- 137,128,000 ObGyn inpatient procedures
- 26.5% of inpatient surgical procedures in adult women



חיתוך החיץ בשנים 2005-2009

% מכלל הלידות



Classification of episiotomy: towards a standardisation of terminology

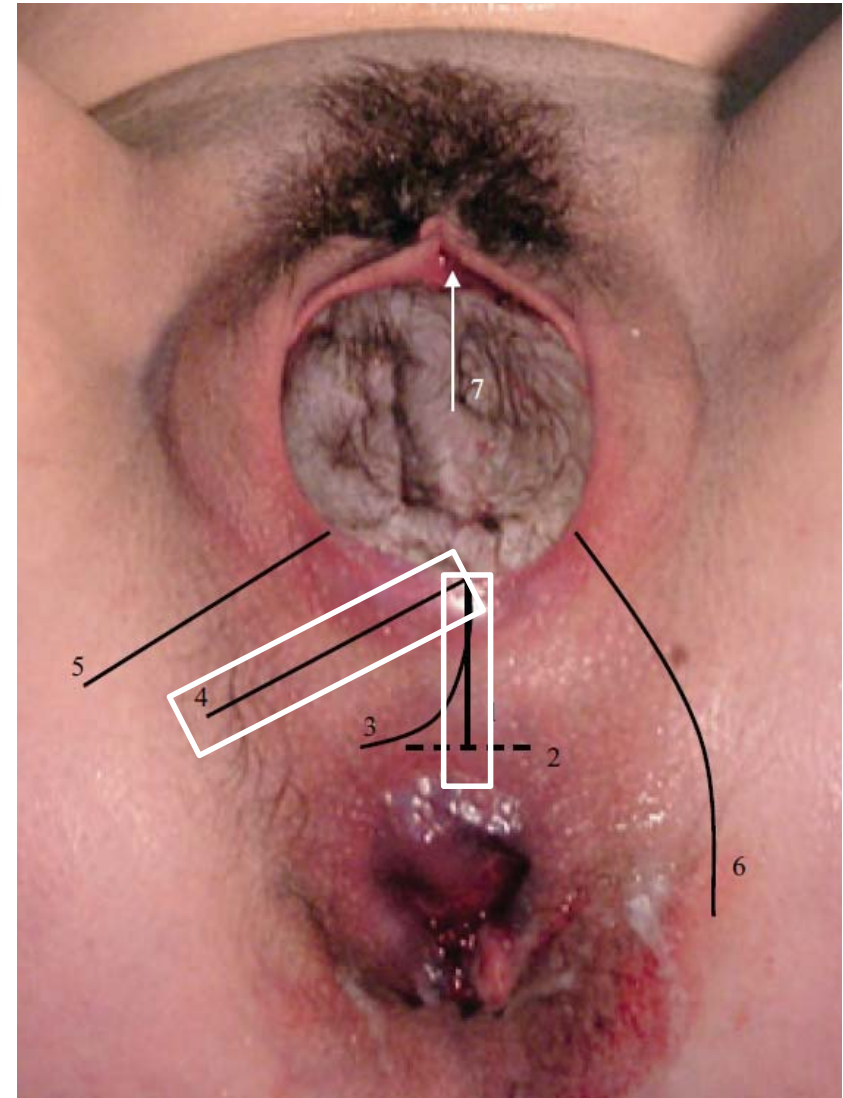
V Kalis,^a K Laine,^b JW de Leeuw,^c KM Ismail,^d DG Tincello^e

^a Department of Obstetrics and Gynaecology, University Hospital, Charles University, Pilsen, Czech Republic ^b Department of Obstetrics, Oslo University Hospital, Ullevål, Oslo, Norway ^c Department of Obstetrics and Gynaecology, Ikazia Hospital, Rotterdam, the Netherlands ^d School of Clinical and Experimental Medicine, College of Medical and Dental Sciences, University of Birmingham, Birmingham, UK ^e Reproductive Sciences Section, Cancer Studies and Molecular Medicine, University of Leicester, Leicester, UK

BJOG 2012;119:522–526

RCT, 407 PP

- **OASIS:** MLE > ME (2%, 11%)
- **Pain:** MLE = ME
- **Scarring:** MLE < ME
- **Earlier intercourse:** MLE < ME



Coats PM et al, Br J Obstet Gynaecol, 1980



Episiotomy for vaginal birth

Guillermo Carroli¹, Luciano Mignini¹

¹Centro Rosarino de Estudios Perinatales, Rosario, Argentina

Cochrane Database of Systematic Reviews 2009, Issue 1. Art. No.: CD000081.



■ 8 studies (5541 women)

■ Episiotomies: Routine episiotomy group - 75.15% ($2035/2708$)

Restrictive episiotomy group - 28.40% ($776/2733$)

Outcome or subgroup title	No. of studies	No. of participants	Effect size Risk Ratio (M-H, Fixed, 95% CI)
Severe perineal trauma	7	4404	0.67 [0.49, 0.91]
8.1 Midline	2	1143	0.74 [0.51, 1.07]
8.2 Mediolateral	5	3261	0.55 [0.31, 0.96]

↔ Dyspareunia

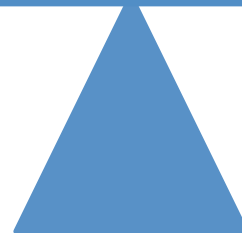
↔ Urinary incontinence

↔ Several pain measures

↓ Severe perineal trauma

↓ Suturing

↓ Healing complications



Restrictive compare to Routine



MLE and the Risk of OASIS



- Carroli G & Mignini L, Cochrane Database Syst Rev, 2009
(8 studies , 5541 women)



- de Leeuw JW et al, BJOG, 2001
- Revicky V et al, Eur J Obstet Gynecol Reprod Biol, 2010
- Zafran N & Salim R, Arch Gynecol Obstet, 2012
- de Vogel J et al, Am J Obstet Gynecol, 2012
- Twidale E et al, Aust N Z J Obstet Gynaecol, 2013



The incision angle of mediolateral episiotomy before delivery and after repair

Vladimir Kalis ^{a,*}, Jaroslava Karbanova ^b, Miroslav Horak ^b, Libor Lobovsky ^b,
Milena Kralickova ^a, Zdenek Rokyta ^a

^a Department of Obstetrics and Gynecology, University Hospital, Faculty of Medicine, Charles University, Pilsen, Czech Republic

^b Department of Mechanics, University of West Bohemia in Pilsen, Pilsen, Czech Republic

International Journal of Gynecology and Obstetrics (2008) 103, 5–8

Evaluation of the incision angle of mediolateral episiotomy at 60 degrees

Vladimir Kalis ^{a,*}, Jana Landsmanova ^a, Barbora Bednarova ^a, Jaroslava Karbanova ^a,
Katriina Laine ^b, Zdenek Rokyta ^a

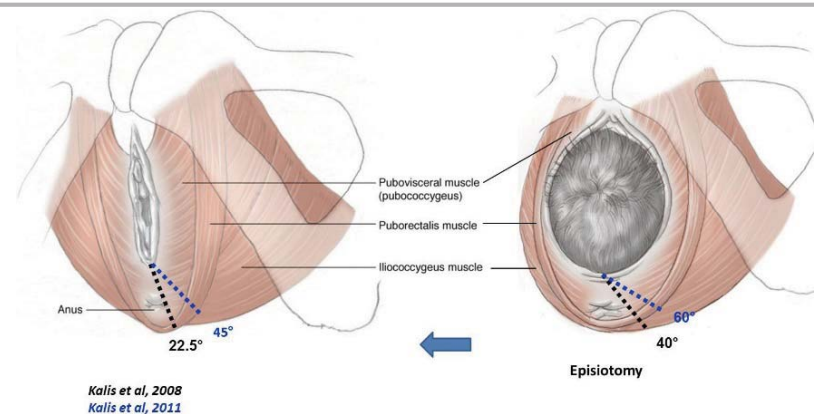
^a Department of Obstetrics and Gynecology, University Hospital, Faculty of Medicine, Charles University, Pilsen, Czech Republic

^b Department of Obstetrics, Oslo University Hospital, Oslo, Norway

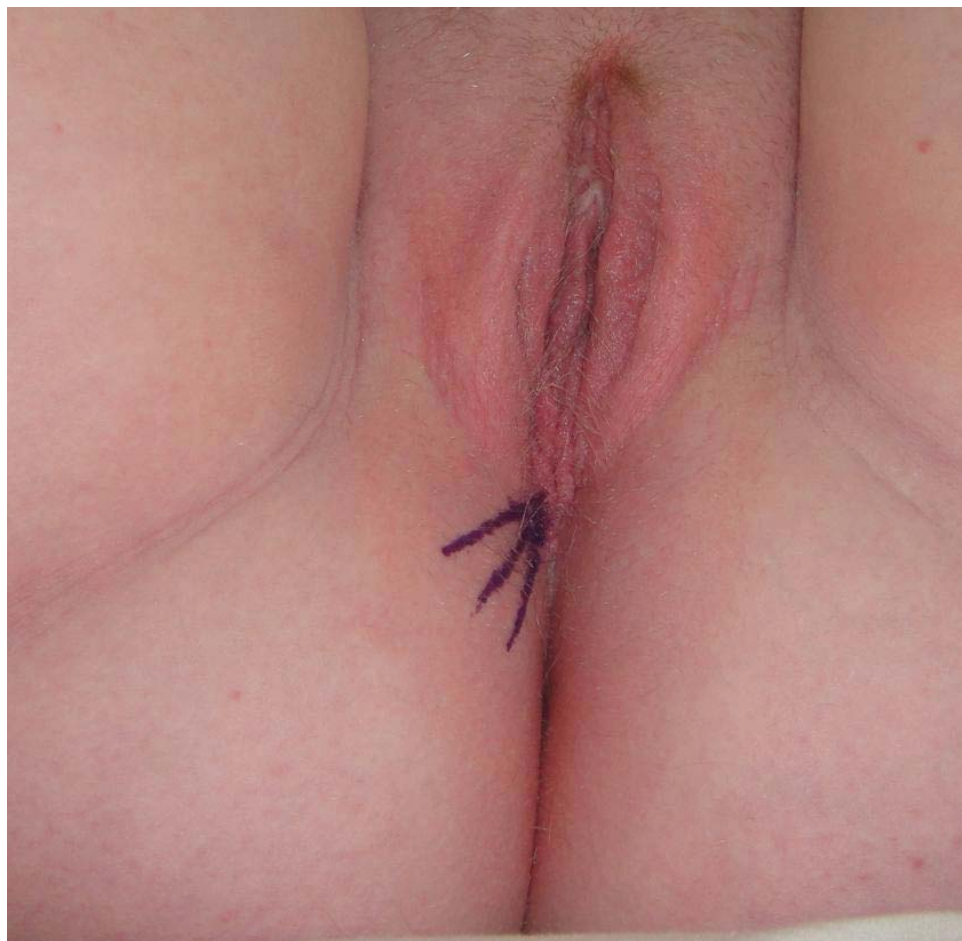
International Journal of Gynecology and Obstetrics 112 (2011) 220–224

MLE angle	n (pp)	Crowning	After repair	p
<i>Kalis V et al, 2008</i>	50	40°	22.5°	<0.001
<i>Kalis V et al, 2011</i>	60	60°	45°	<0.001

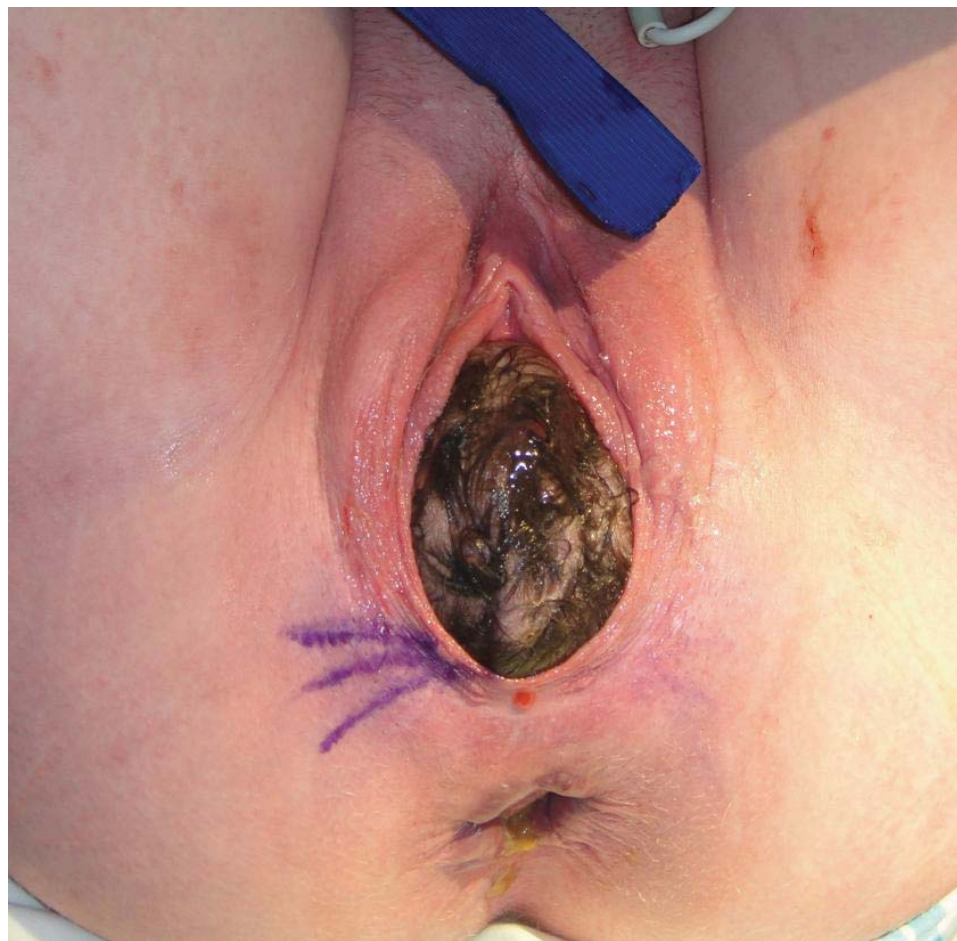
pp = primiparae



Marked angles during 1st stage of labor



Appearance of the pre-marked angles during crowning



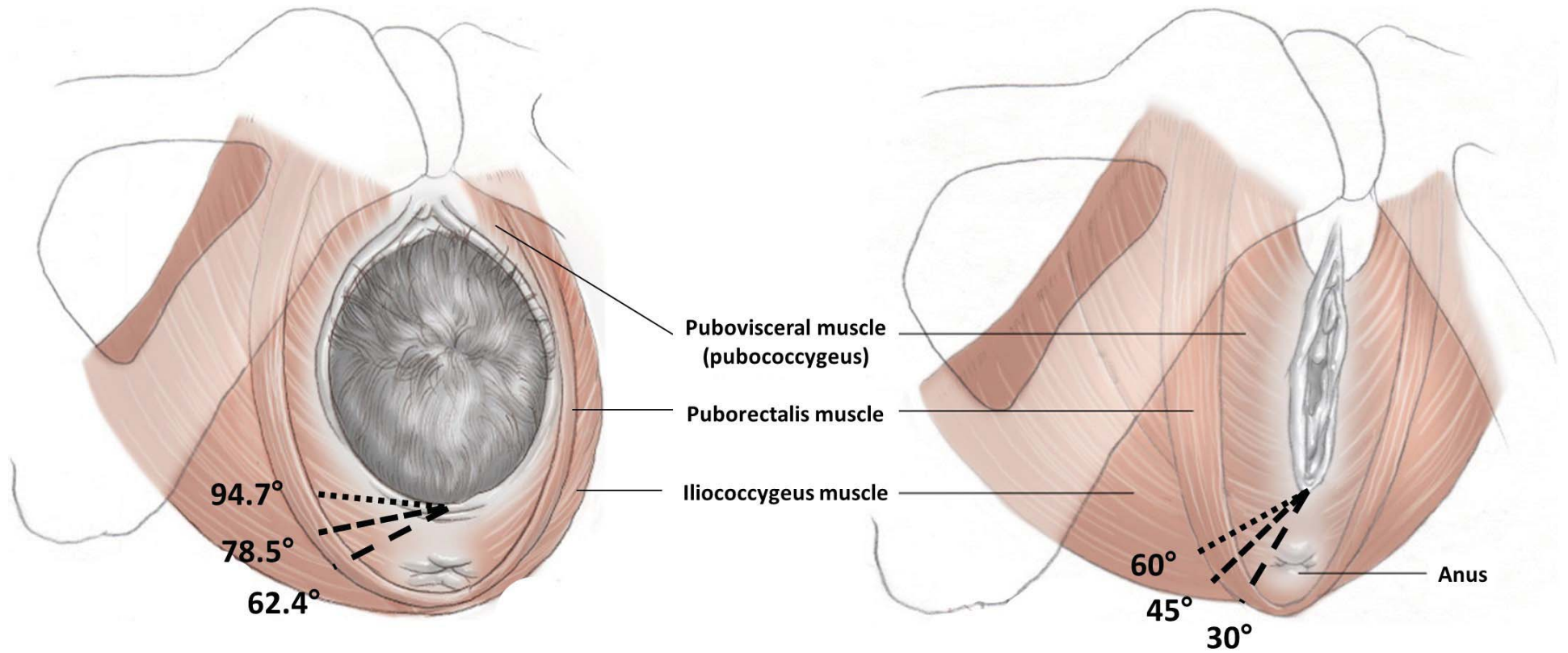
Marked angles during 1st stage of labor



Appearance of the pre-marked angles during crowning



Results



Appearance of the pre-marked angles during crowning

Marked angles during 1st stage of labor

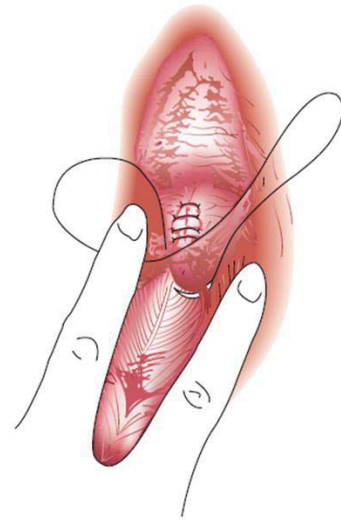


Results

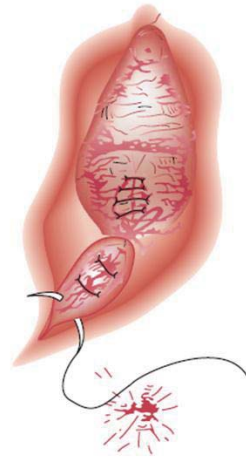
Angle at 1 st stage	n	30 degree	45 degree	60 degree
Angle at crowning				
All	102	62.4° ± 8.2°	78.5° ± 8.7°	94.7° ± 9.3°
Primiparae	50	62.6° ± 8.0°	78.7° ± 8.8°	95.5° ± 9.1°
Multiparae	52	62.3° ± 8.5°	78.4° ± 8.8°	93.9° ± 9.5°
<i>p</i>		0.755	0.756	0.383

Mean ± SD

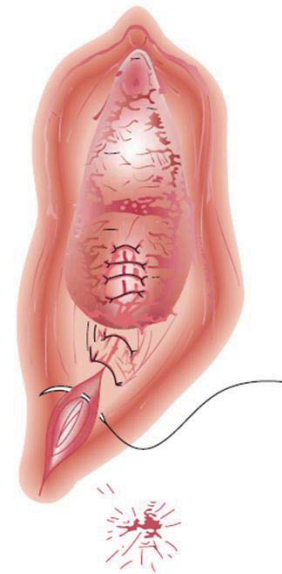




a. Continuous, locking (blanket) stitch to vaginal wall

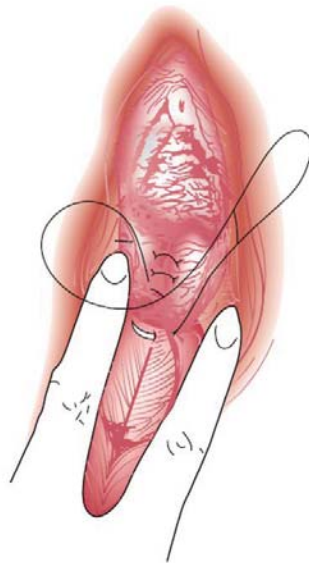


b. Interrupted sutures to perineal muscles

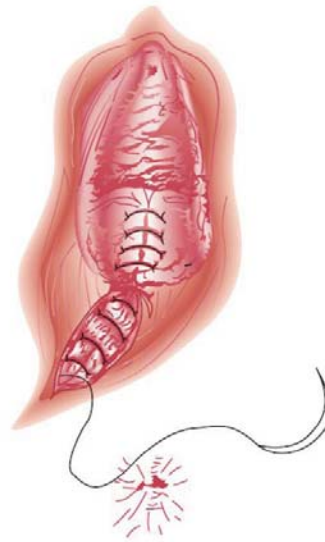


c. Interrupted stitches to skin

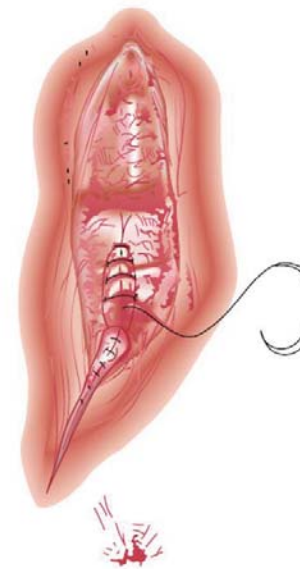
The traditional interrupted method of perineal repair.



a. Loose, continuous non-locking stitch to vaginal wall



b. Loose, continuous non-locking stitch to perineal muscles



c. Closure of skin using a loose subcutaneous stitch

Continuous suturing technique for mediolateral episiotomy.



Continuous and interrupted suturing techniques for repair of episiotomy or second-degree tears



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Cochrane Database of Systematic Reviews 2012, Issue 11. Art. No.: CD000947.

■ 16 studies (8184 women)

↔ Re-suturing of wound (<3m)
↔ Long-term pain (<3m)
↔ Dyspareunia (3m)

↓ Short-term pain (<10d)
↓ Analgesia use (<10d)
↓ Removal of suture material (<3m)
↓ Suture material

Continuous compare to Interrupted





Absorbable suture materials for primary repair of episiotomy and second degree tears

Christine Kettle¹, Therese Dowswell², Khaled MK Ismail³



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Cochrane Database of Systematic Reviews 2010, Issue 6. Art. No.: CD000006.

■ Catgut:

Collagen derived from the intestines of healthy mammals (sheep and cows)

■ Absorbable synthetic:

- | | |
|--|------|
| ■ Dexon - polyglycolic acid | 120d |
| ■ Vicryl - polyglactin 910 (glycolic and lactic acids - 90/10) | 90d |
| ■ Vicryl Rapide - polyglactin 910 → γ irradiation | 42d |



Absorbable suture materials for primary repair of episiotomy and second degree tears

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Cochrane Database of Systematic Reviews 2010, Issue 6. Art. No.: CD000006.

■ 11 trials (5072 women)

↑ Removal of unabsorbed suture

↔ Long-term pain (<3m)
↔ Dyspareunia (3m)

↓ Short-term pain (<3d)
↓ Analgesia use (<10d)
↓ Re-suturing

Standard synthetic compare to Catgut



Absorbable suture materials for primary repair of episiotomy and second degree tears

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Cochrane Database of Systematic Reviews 2010, Issue 6. Art. No.: CD000006.

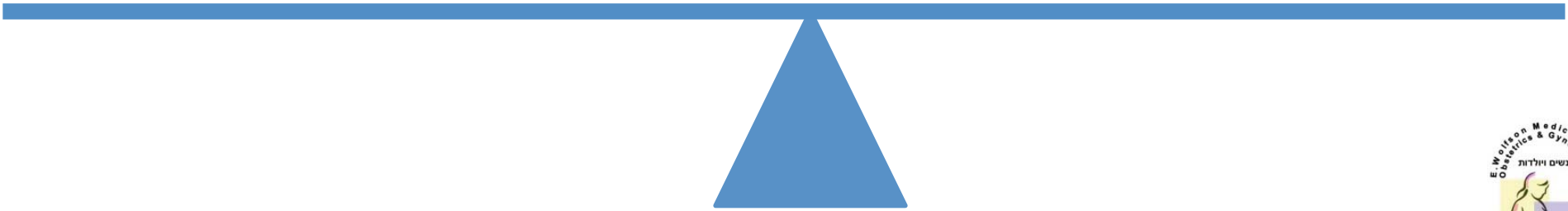
■ 5 trials (2349 women)

↑ Analgesia use (<10d)

↔ Long-term pain (<14d)

↑ Removal of unabsorbed suture

↔ Short-term pain (<3d)



Standard synthetic compare to Rapidly absorbing

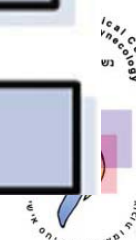
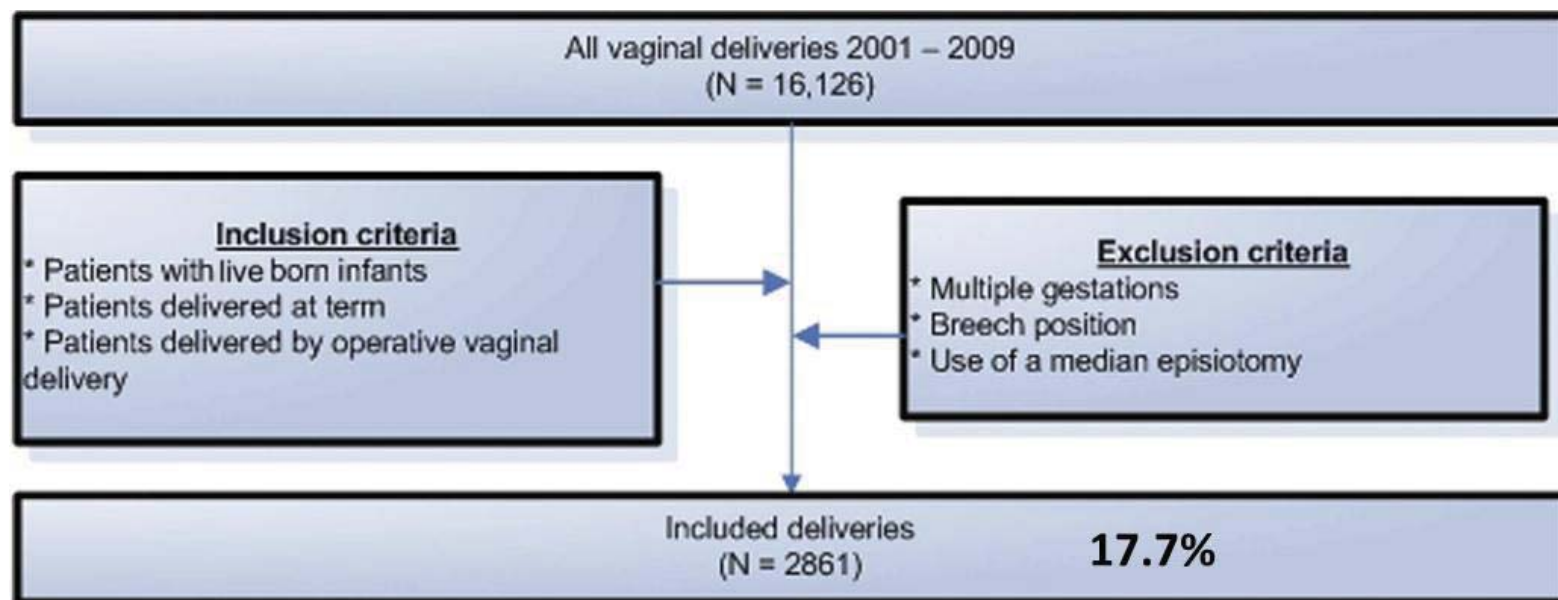


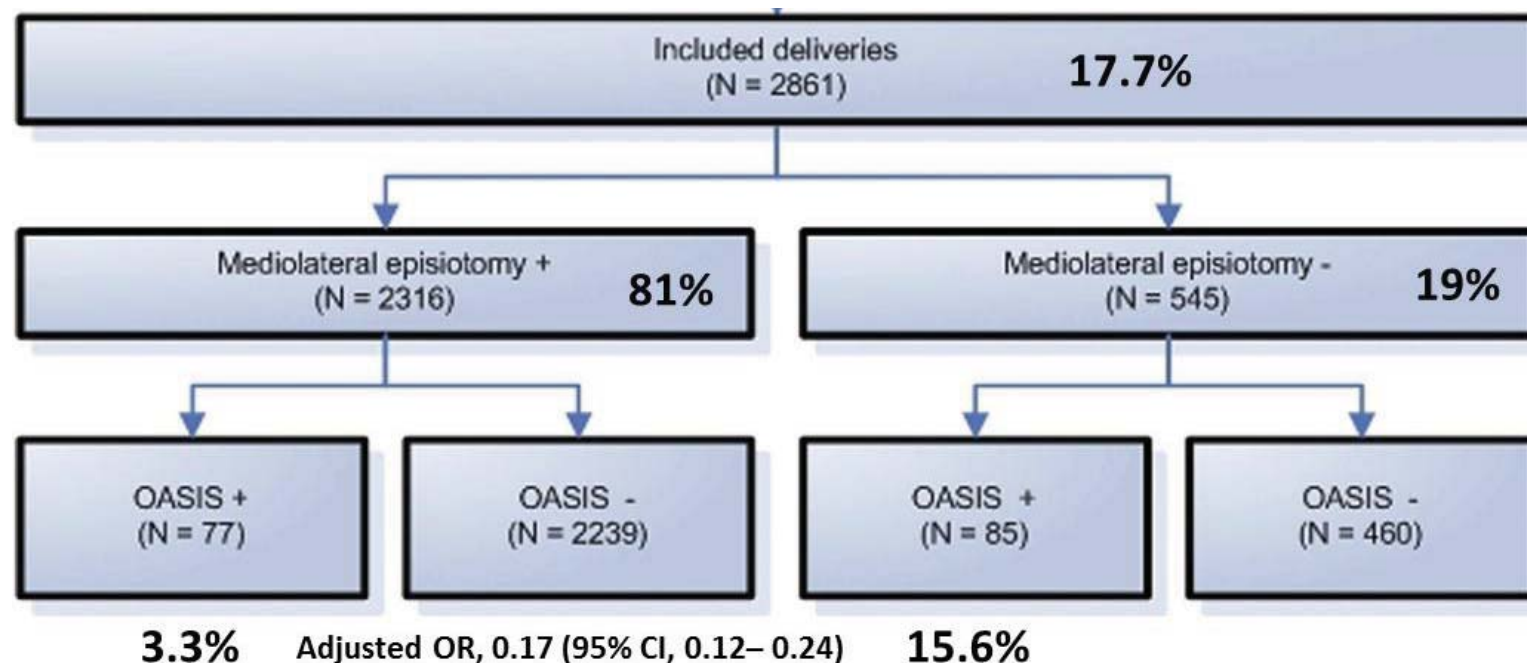
The effect of a mediolateral episiotomy during operative vaginal delivery on the risk of developing obstetrical anal sphincter injuries

Joey de Vogel, MD; Anneke van der Leeuw-van Beek, MD; Dirk Gietelink, MD, PhD; Marijana Vujkovic, PhD; Jan Willem de Leeuw, MD, PhD; Jeroen van Bavel, MD; Dimitri Papatsonis, MD, PhD

Am J Obstet Gynecol 2012;206:404.e1-5.

From the Departments of Obstetrics and Gynaecology, Amphia Hospital Breda, Breda (Drs de Vogel, van der Leeuw-van Beek, Gietelink, van Bavel, and Papatsonis); Erasmus Medical Center, Rotterdam (Dr Vujkovic); and Ikazia Hospital Rotterdam, Rotterdam (Dr de Leeuw), The Netherlands.





Multivariate analysis on the risk for developing OASIS in vacuum deliveries and forcipal deliveries

Variable	Vacuum extraction (n = 2520)			Forcipal extraction (n = 316)		
	OASIS/n (%)	RR	Adjusted ^a OR (95% CI)	OASIS/n (%)	RR	Adjusted ^a OR (95% CI)
MLE+	70/1996 (3.51)	0.23	0.18 (0.13–0.26)	4/295 (1.36)	0.05	0.03 (0.00–0.14)
MLE–	79/524 (15.08)	1		6/21 (20.57)	1	

CI, confidence interval; MLE, mediolateral episiotomy; OASIS, obstetrical anal sphincter injuries; OR, odds ratio; RR, relative risk.

^a Adjusted for: maternal age, parity, presence of fetal distress, usage of epidural anesthesia, daytime obstetrics, birthweight >4000 g, fetal head position and prolonged pushing (>60 min).



Hospital		Total Deliveries*	3rd Degree Tears		4th Degree Tears		3rd+4th Degree Tears		Change
			n	Rate	n	Rate	n	Rate	
1	1 Year Before Workshop	2,699	25	0.93%	4	0.15%	29	1.07%	
	1 Year After Workshop	2,527	16	0.63%	2	0.08%	18	0.71%	-33.7%
2	1 Year Before Workshop	8,906	10	0.11%	4	0.04%	14	0.16%	
	1 Year After Workshop	9,666	15	0.16%	1	0.01%	16	0.17%	+5.3%
3	1 Year Before Workshop	2,604	7	0.27%	0	0.00%	7	0.27%	
	1 Year After Workshop	2,831	23	0.81%	1	0.04%	24	0.85%	+215.4%
4	1 Year Before Workshop	3,275	13	0.40%	1	0.03%	14	0.43%	
	1 Year After Workshop	3,642	18	0.49%	4	0.11%	22	0.60%	+41.3%
5	1 Year Before Workshop	6,424	12	0.19%	2	0.03%	14	0.22%	
	1 Year After Workshop	6,918	21	0.30%	1	0.01%	22	0.32%	+45.9%
6	1 Year Before Workshop	7,277	32	0.44%	3	0.04%	35	0.48%	
	1 Year After Workshop	7,191	51	0.71%	2	0.03%	53	0.74%	+53.2%
7	1 Year Before Workshop	8,735	38	0.44%	2	0.02%	40	0.46%	
	1 Year After Workshop	8,436	39	0.46%	3	0.04%	42	0.50%	+8.7%
8	1 Year Before Workshop	2,126	3	0.14%	1	0.05%	4	0.19%	
	1 Year After Workshop	2,508	6	0.24%	1	0.04%	7	0.28%	+48.3%
Total	1 Year Before Workshop	42,046	140	0.33%	17	0.04%	157	0.37%	
	1 Year After Workshop	43,719	189	0.43%	15	0.03%	204	0.47%	+25.0%
			$p = 0.022$		$p = 0.774$		$p = 0.04$		

*Total No. of vaginal singleton deliveries



