

APPLIED EVIDENCE

New research findings that are changing clinical practice

Obstetric anal sphincter injury: How to avoid, how to repair: A literature review

Practice recommendations

- Avoiding obstetrical injury to the anal sphincter is the single biggest factor in preventing anal incontinence among women (**A**). Any form of instrument delivery has consistently been noted to increase the risk of obstetric anal sphincter injury and altered fecal continence by between 2- and 7-fold (**A**).
- Routine episiotomy is not recommended (**A**). Episiotomy use should be restricted to situations where it directly facilitates an urgent delivery (**A**). A mediolateral incision, instead of a midline, should be considered for persons at otherwise high risk of obstetric anal sphincter injury (**A**).
- The internal anal sphincter needs to be separately repaired if torn (**A**).
- Women with injuries to the internal anal sphincter or rectal mucosa have a worse prognosis for future continence problems (**A**). All women, particularly those with risk factors for injury, should be surveyed for symptoms of anal incontinence at postpartum follow-up (**C**).

Do you routinely check with new first-time mothers at a postpartum visit about changes in anal continence? They are at particular risk for obstetric anal sphincter injury and could

be too embarrassed to raise the issue.

Sphincter injury following labor is the most common cause of anal incontinence (including flatus) in women, which can severely diminish quality of life and lead to considerable personal and financial costs.¹ Endoanal ultrasound can detect these injuries, even in the absence of clinically obvious damage to the anal sphincter (occult obstetric anal sphincter injury).²

In this article, we review measures to reduce the occurrence of obstetric anal sphincter injury, proper primary repair when it does occur, and appropriate long-term follow-up. Women with known obstetric anal sphincter injury must also be counseled about the risk of further damage during a future vaginal delivery.

■ Injury more common than symptoms would suggest

The conventional definitions of the 4 grades of perineal laceration in the US have been supplemented by more recent modifications included in a recent British Royal College of Obstetricians and Gynaecologists (RCOG) guideline (**TABLE 1**).³ The definition of third-degree laceration now reflects the various degrees of anal sphincter injury that may occur: partial (3a), full-thickness (3b), external anal sphincter injury, with or without injury to the internal anal sphincter (3c).

The incidence of clinical third- and

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TABLE 1

Classification of perineal injury ^a	
INJURY	DEFINITION
First degree	Injury confined to vaginal mucosa
Second degree	Injury of vaginal mucosa and perineal muscles, but not the anal sphincter
Third degree	Injury to the perineum involving the anal sphincter complex (external and internal)
3a	<50% of external sphincter thickness is torn
3b	>50% of external sphincter thickness is torn
3c	Internal sphincter is torn
Fourth degree	Injury to external and internal sphincter and rectal mucosa/anal epithelium

fourth-degree lacerations varies widely; it is reported at between 0.5% and 3.0% in Europe and between 5.85% and 8.9% in the US.^{2,4-6} A landmark British paper from 1993 revealed that though only 3% had a clinical third- or fourth-degree perineal laceration, 35% of primiparous women (none of whom had any defect before delivery) had ultrasound evidence of varying degrees of anal sphincter defect at 6 weeks postpartum that persisted at 6 months.² However, only about a third of these women had symptoms of bowel disturbance during the time of study.

These findings are supported by a meta-analysis in which 70% of women with a documented obstetric anal sphincter injury were asymptomatic.⁷ This meta-analysis concluded that clinical or occult obstetric anal sphincter injury occurs in 27% of primigravid women, and in 8.5% of multiparous women.

The long-term significance of occult obstetric anal sphincter injury and any relationship with geriatric fecal incontinence is unknown, although 71% of a sample of women with late-onset fecal incontinence were found to have ultrasound evidence of an anal sphincter defect thought to have occurred at a previous vaginal delivery.⁸ A recent English study⁹ reveals that when women were carefully re-examined after delivery by a skilled

obstetrician looking specifically at the anal sphincter, the prevalence of clinically diagnosed third-degree lacerations rose sharply from the 11% initially diagnosed by the delivering physician or midwife to 24.5%. A subsequent endoanal ultrasound detected only an additional 1.2% (3 injuries, 2 of which were in the internal anal sphincter and therefore clinically undetectable). This strongly suggests that the vast majority of obstetric anal sphincter injuries can be detected clinically by a careful exam and that, when this is done, true occult injuries will be a rare finding.

■ Mechanisms of injury

Maintenance of fecal continence involves the coordinated action of several anatomical and physiological elements (**FIGURE 1**).¹⁰ An intact, innervated anal sphincter complex (both external and internal) is necessary. The sphincter complex can be damaged during childbirth in 3 ways.

Direct mechanical injury. Direct external or internal anal sphincter muscle disruption can occur, as with a clinically obvious third- or fourth-degree perineal laceration or an occult injury subsequently noted on ultrasound.

Neurologic injury. Neuropathy of the pudendal nerve may result from forceps delivery or persistent nerve compression from the fetal head.¹⁴ Traction neuropathy may also occur with fetal macrosomia and with prolonged pushing during Stage 2 in successive pregnancies, or with prolonged stretching of the nerve due to persistent poor postpartum pelvic floor tone. Injured nerves often undergo demyelination but usually recover with time.

Combined mechanical and neurologic trauma. Isolated neurologic injury, as described above, is believed to be rare. Neuropathy more commonly accompanies mechanical damage.¹⁵

■ Who is at risk?

Several risk factors are unavoidable. One of these is primiparity, a consistently

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Instrument delivery increased risk of anal injury 2- to 7-fold; vacuum-assisted delivery should be used when circumstances allow

reported independent variable also associated with other risk factors for obstetric anal sphincter injury, such as instrument delivery (TABLE 2).

■ Preventing obstetric anal sphincter injury

Sphincter injury can occur even when obstetrical management is optimal. Although evidence from RCT data is often lacking, sufficient observational and retrospective data support the following recommendations to reduce the likelihood of injury.

Choose vacuum delivery before forceps

Any form of instrument delivery increases the risk of obstetric anal sphincter injury and altered fecal continence by between 2- and 7-fold.^{2,16,24} An RCT found clinical third-degree tears in 16% of women with forceps-assisted deliveries, compared with 7% of vacuum-assisted deliveries; the authors concluded that, when circumstances allow, vacuum delivery should be attempted first (acknowledging however that 23% of vacuum deliveries failed and proceeded to a forceps extraction, a sequence associated with increased injury).¹⁷ A meta-analysis confirmed that vacuum extraction is preferred when instrumental delivery is necessary (SOR: A).²⁵

When midline episiotomy was performed during instrument delivery, the risk of obstetric anal sphincter injury approximately doubled again, such that, in one study, forceps delivery with episiotomy caused a 25-fold increase in obstetric anal sphincter injury.²⁴

Any steps that may safely reduce the need for instrument delivery should be supported. Toward this end, the Canadian Clinical Practices Obstetrics committee has recommended evidence-based labor interventions such as one-to-one support in labor, the increased use of a partogram in labor and appropriate oxytocin use, all in an effort to reduce needs for operative interventions.²⁶

TABLE 2

Major risk factors for obstetric anal sphincter injury

RISK FACTOR	ODDS RATIO
Nulliparity (primigravidity)	3–4
Inherent predisposition: Short perineal body	8
Instrumental delivery, overall	3
Forceps-assisted delivery	3–7
Vacuum-assisted delivery	3
Forceps vs vacuum	2.88*
Forceps <i>with</i> midline episiotomy	25
Prolonged second stage of labor (>1 hour)	1.5–4
Epidural analgesia	1.5–3
Intrapartum infant factors: Birthweight over 4 kg	2
Persistent occipitoposterior position	2–3
Episiotomy, mediolateral	1.4
Episiotomy, midline	3–5
Previous anal sphincter tear	4

All variables are statistically significant at $P < .05$.

*Relative risk of altered fecal symptoms based on RCT findings, vacuum vs forceps.¹⁷ Data from randomized controlled trials are lacking for most labor variables. Due to differing methods of analysis (univariate vs regression) and outcome measures, risk ratios reported in the literature vary considerably. This table presents the approximate odds ratios for risk factors that have been reported most consistently from 1 prospective cohort study,¹⁶ 1 randomized controlled trial,¹⁴ and, otherwise higher-quality retrospective analyses.^{18–23}

If episiotomy necessary, mediolateral less risky than midline

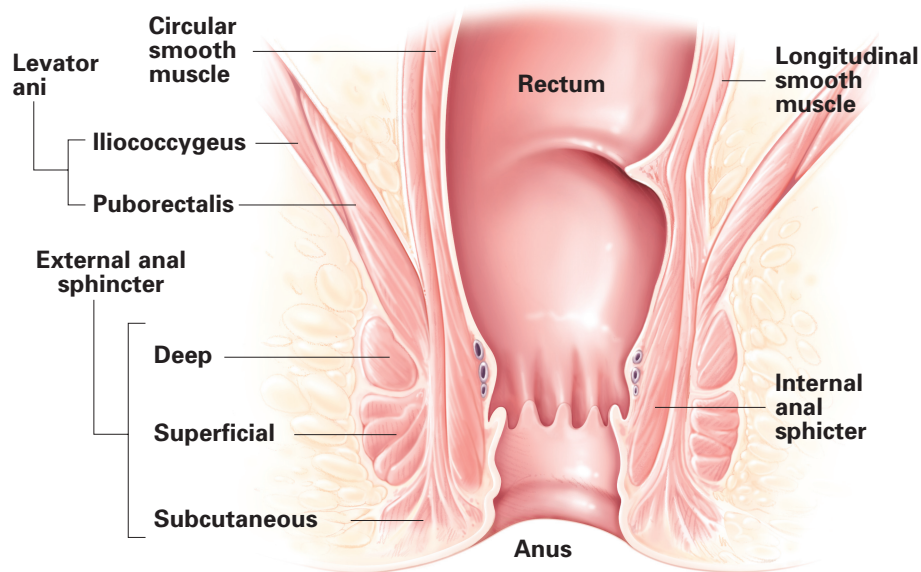
Episiotomy was long promoted as a means of preserving the integrity of the perineal musculature and of avoiding damage to the anal sphincter, and it has been practiced routinely by some.²⁷ Strong evidence now indicates that routine episiotomy (midline or mediolateral) is unhelpful and should be abandoned.^{25,27–29}

Observational evidence overwhelmingly shows that midline episiotomy is strongly associated with obstetric anal sphincter injury.^{19,22,23,30,31} One of the few RCTs comparing midline with mediolateral episiotomy, although flawed in its design, noted that a clinical third-degree laceration

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FIGURE 1

Anatomy and physiology of the female anal canal



The anal sphincter complex consists of internal and external components.¹¹

The **internal anal sphincter** is a downward extension and thickening of the inner circular smooth muscle of the rectum, which lies just below the rectal mucosa. It is therefore invariably damaged in fourth-degree lacerations but may also be damaged without overt disruption of the rectal mucosa.¹²

The internal anal sphincter is controlled not voluntarily but by autonomic influences. The internal anal sphincter contributes 70% to resting

anal sphincter complex tone.

Damage to the internal anal sphincter is much more predictive of severe fecal incontinence symptoms than damage to the external sphincter.¹¹

The **external anal sphincter** is usually divided into 3 components: from distal to proximal, these are the subcutaneous, superficial, and deep parts. Through endo-anal ultrasound, it has become apparent that, in women, the deep part is relatively deficient anteriorly, so that the subcutaneous and superficial parts of the external anal sphincter are the most clinically relevant in obstetric anal sphincter injury.¹³ It is the anterior portion of the external anal sphincter (12 o'clock position) that is

invariably torn in obstetrical injuries.

The external anal sphincter is intimately associated with that part of the levator ani muscle—the puborectalis—that forms a supportive sling around the rectum. The external anal sphincter is composed of striated skeletal muscle and is under voluntary control, but it also contributes 25% to resting anal sphincter tone. Therefore, with other components of the levator ani, the external anal sphincter serves to maintain voluntary continence. The external anal sphincter is innervated by the pudendal nerves.

ILLUSTRATION BY RICH LaROCCO

occurred as an extension of episiotomy in 11.6% of midline incisions compared with just 2% of mediolateral cuts.³²

Another RCT, designed to examine routine versus restrictive episiotomy, noted that all but 1 (98%) of the 47 third- or fourth-degree lacerations in a group of 700 women followed midline episiotomy.²⁹ A retrospective database analysis noted a 6-fold higher risk of third-degree perineal lacerations for women undergoing midline episiotomy compared with mediolateral incision.²³ Elsewhere, midline episiotomy was associated with a 5-fold increase in symptoms of fecal incontinence at 3

months postpartum when compared with women with an intact perineum.²⁴

Even when midline episiotomies do not extend into clinical third-degree lacerations, the incidence of resultant postpartum fecal incontinence triples when compared with spontaneous second-degree perineal lacerations.³⁰ The authors postulate that a perineum cut by midline episiotomy allows for more direct contact to occur between the fetal hard parts and the anal sphincter complex during delivery, thereby increasing occult obstetric anal sphincter injury.

Observational data conflict as to

whether mediolateral episiotomy contributes to, or protects against, obstetric anal sphincter injury—although the burden of evidence favors it as a risk factor that should be avoided when possible.^{16,23,33} An angle of mediolateral incision cut closer to 45 degrees from the midline has been associated with less obstetric anal sphincter injury than incisions cut at closer angles to the midline.³⁴

■ Repairing sphincter injury

Detecting injury in labor

With any severe perineal laceration, closely inspect the external and, if exposed, internal anal sphincter and perform a rectal exam, particularly for women with numerous risk factors (although no good evidence supports the role of the rectal exam in diagnosing obstetric anal sphincter injury). Colorectal surgeons have advocated the use of a muscle stimulator to assist in identifying the ends of the external sphincter, but this has not become common practice.³⁵

Immediate vs delayed repair

It is standard practice to repair a damaged anal sphincter immediately or soon after delivery. However, given that a repair should be well done, and since a short delay does not appear to adversely affect healing, be prepared to wait for assistance for up to 24 hours rather than risk a suboptimal repair.³⁶

Better training is needed

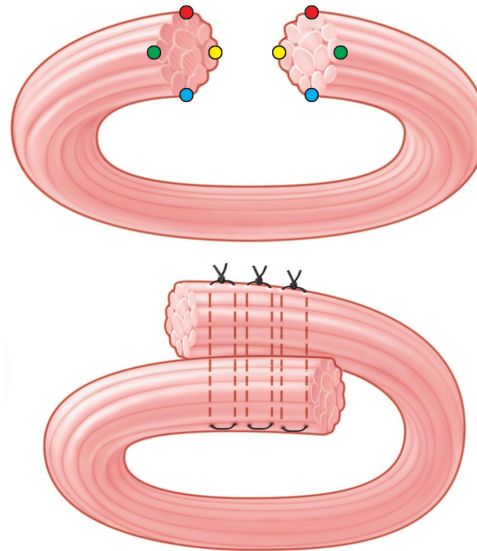
Even among trained obstetricians and ob-gyn residents, 64% have reported no training or unsatisfactory training in management of obstetric anal sphincter injury; 94% of physicians felt inadequately prepared at the time of their first independent repair of the anal sphincter.^{37,38} To improve your repair skills in a workshop setting, consult the following sources—www.aafp.org/also.xml in the US, or www.perineum.net in UK).

Analgesia and setting

Adequate analgesia is an essential element in a good repair. Complete relaxation of

FIGURE 2

2 methods of anal sphincter repair



Two commonly used methods of external anal sphincter repair are end-to-end approximate of the cut ends (top), and overlapping the cut ends and suturing through the overlapped portions (bottom). (Adapted from Leeman et al, *Am Fam Physician* 2003.³³)

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the anesthetized anal sphincter complex facilitates bringing torn ends of the sphincter together without tension.³⁹ Though theoretically this can be attained with local anesthetic infiltration, RCOG recommends that regional or general anesthesia be considered to provide complete analgesia.³⁷ It is further recommended that repair of the anal sphincter occur in an operating room, given the degree of contamination present in the labor room after delivery and the devastating effects of an infected repair (SOR: C).⁴⁰

Repair technique

There are 2 commonly used methods of external anal sphincter repair: one, the traditionally taught end-to-end approximation of the cut ends, and the other, overlapping the cut ends of the external sphincter and suturing through the overlapped portions (**FIGURE 2**).³⁶ Though an RCT from 2000 noted no significant difference in outcomes between these methods,⁴¹ other authors have suggested that an overlapping tech-

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Strong evidence shows that routine episiotomy should be abandoned; midline episiotomy is strongly linked with anal sphincter injury

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TABLE 3

Fecal Continence Scoring scale

SYMPTOM

1. Passage of any flatus when socially undesirable
2. Any incontinence of liquid stool
3. Any need to wear a pad because of anal symptoms
4. Any incontinence of solid stool
5. Any fecal urgency (inability to defer defecation for more than 5 minutes)

SCALE

- 0 Never
- 1 Rarely (<1/month)
- 2 Sometimes (1/week – 1/month)
- 3 Usually (1/day – 1/week)
- 4 Always (>1/day)

A score of 0 implies complete continence and a score of 20 complete incontinence. A score of 6 has been suggested as a cut-off to determine need for evaluation.

Source: Mahony et al, 2001;⁴³ modified from Jorge and Wexner, 1993.⁴⁴

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Immediately after repair, consider giving patients laxatives and broad-spectrum antibiotics, and possibly refer for physical therapy

nique is preferred, and it remains the method most often used by colorectal surgeons in elective, secondary anal sphincter repairs.^{36,39,42}

A Cochrane review of which technique is better has been registered in the Clinical Trials Database. General agreement is that closure using interrupted sutures of a monofilament material, such as 2-0 polydioxanone sulfate (PDS), is the preferred closure method for the external sphincter (SOR: C).^{36,40} It is recommended that a damaged internal sphincter be repaired with a running continuous suture of a material such as 2-0 polyglactin 910 (Vicryl) (SOR: C).³⁶

■ Immediate post-repair management

Use a stool softener

It had long been thought that constipation following obstetric anal sphincter injury allowed the sphincter to heal more effectively. However, new evidence from RCTs shows that using a laxative instead of a constipating regimen is more helpful in the immediate postpartum phase.⁴³ Toward this end, use a stool softener, such as lactulose,

for 3 to 10 days postpartum for women with obstetric anal sphincter injury.⁴⁰

Should you prescribe an antibiotic?

Given the devastating effects of post-repair infection, most authorities consider it prudent to prescribe a course of broad-spectrum antibiotics, possibly including metronidazole (SOR: C).^{37,40} A Cochrane review is registered to further examine this issue. A separate Cochrane review of the use of antibiotics for instrument vaginal delivery concluded that quality data were insufficient to make any recommendations.⁴⁴

Refer for physical therapy

Some authorities consider an early referral to physical therapy for pelvic floor exercises helpful in the immediate post-partum for all patients with obstetric anal sphincter injury (SOR: C).⁴⁵

■ Long-term management

Ask patients about incontinence

Given that some women are too embarrassed to seek assistance, ask those with obstetric anal sphincter injury specific questions about any symptoms of anal incontinence at a follow-up visit, such as the 6-week postpartum visit (SOR: C).^{37,40} In some practices, all women who have sustained a third- or fourth-degree laceration are routinely scheduled for a 3-month follow-up visit to a dedicated clinic, irrespective of symptoms. Given the prevalence of occult obstetric anal sphincter injury for primigravid women, you may find it best to survey all women postnatally concerning any changes in anal continence. **TABLE 3** demonstrates a validated, modified patient survey of anal incontinence.^{37,40} A score of 6 is often used as a cutoff.

When additional evaluation is needed

Patients who have symptoms of altered continence at 3 months (or who score above 6 on the Wexner scale) should be seen at a dedicated gynecologic or colorectal surgery clinic,⁴⁶ where they can receive a more detailed clinical evaluation and

undergo anal manometry (during resting and forced squeezing) or endo-anal ultrasonography. Some patients respond well to physical therapy, though a few patients ultimately require reconstructive colorectal surgery and temporary colostomy.

Management in a subsequent pregnancy

Women who have had an obstetric anal sphincter injury are at increased risk for repeat injury in a future pregnancy.⁴⁸ At some units, all such women are routinely offered a prenatal visit at the end of the second trimester to review their symptoms and to evaluate the anal sphincter with manometry or ultrasound. A large prospective study, however, found that recurrence of obstetric anal sphincter injury could not be predicted and that 95% of women with prior injury did not sustain further overt sphincter damage during a subsequent vaginal delivery.⁴⁹

However, for some women, a repeat anal sphincter laceration could prove devastating. For these women—eg, those with previous severe symptoms that required secondary surgical repair—initiate an in-depth discussion concerning the risks and benefits of elective cesarean delivery versus vaginal delivery.^{37,40} ■

CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

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New definitions and prevalence of incontinence

Historically, fecal incontinence was defined as “the involuntary or inappropriate passage of feces.”¹⁰ However, a preferred definition now refers instead to anal incontinence, which is “any involuntary loss of feces or flatus, or urge incontinence, that is adversely affecting a woman’s quality of life.”⁴⁰ This definition includes urgency of defecation and incontinence of flatus, both of which are much more common symptoms than fecal incontinence.⁵⁰

Data are lacking on the community prevalence of incontinence, although it is known that women of age 45 experience 8 times the incidence of incontinence as men of the same age and that it increases in prevalence with age.¹⁰ A Canadian survey of almost 1000 women at 3 months postpartum revealed that 3.1% admitted to incontinence of feces while 25% admitted to involuntary escape of flatus. The subgroup of women who suffered clinical anal sphincter injury (that is, third- or fourth-degree lacerations) had considerably increased rates of incontinence of feces (7.8%) and of flatus (48%).²⁴ It has been reported that approximately half of women who sustained anal sphincter tears in labor complained of anal, urinary, or perineal symptoms at a mean follow-up of 2.6 years after the injury.⁵¹ Most studies agree that many women are embarrassed about symptoms of anal incontinence and are reluctant to self-report them.⁵⁰

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Given primagravid women's rate of anal sphincter injury, you might find it best to survey all post-natally concerning changes in continence

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