Episiotomy during vaginal delivery was first recommended in 1920 as a way to protect the pelvic floor from lacerations and protect the fetal head from trauma. It was rapidly adopted as a standard practice and has been widely used since then. However, over the last several decades, there has been a growing body of evidence that episiotomy does not provide these purported benefits and may contribute to more severe perineal lacerations and future pelvic floor dysfunction. In this review, we examine the evidence that led to changing episiotomy practices and the debate that has surrounded episiotomy. By doing so, we can not only evaluate this specific obstetric procedure, but also gain insights into the challenge of changing medical practice as new data emerge.

Introduction

Episiotomy is a surgical incision of the perineum performed to widen the vaginal opening for the delivery of an infant. An episiotomy is cut with scissors or a scalpel as the infant's head is crowning. Two types of episiotomy have been described, median and mediolateral. A median episiotomy is a vertical incision into the midline of the perineum from the posterior fourchette toward the anus. For a mediolateral episiotomy, the incision starts at the hymenal ring and extends downward at an angle of at least 45° from the midline.\(^1\) In general, median episiotomies are more commonly performed in the USA, while mediolateral episiotomies are more common in other parts of the world. The incision is then typically repaired after delivery of the placenta is completed.

The use of a surgical incision of the perineum during childbirth was first described in 1742.\(^2\) It was introduced into the USA in the mid-19th Century. In 1920, at a meeting of the American Gynecological Society in Chicago, USA, Joseph DeLee first publicly advocated the routine adoption of mediolateral episiotomy for all deliveries in nulliparous women.\(^3\) DeLee argued, in very stark language, that allowing 'natural' childbirth so frequently resulted in damage to the woman and her child, that intervention was obligatory: "In fact, only a small minority of women escape damage, while 4% of babies are killed and an indeterminable number [are] injured … If you believe a woman after delivery should be as healthy [and] anatomically perfect as before … then you have to agree [that] labor is pathogenic". His rationales for episiotomy included shortening of the second stage, thereby reducing maternal exhaustion and blood loss, preservation of the pelvic floor, prevention of uterine prolapse and reducing the rates of short- and long-term damage to infants. These arguments proved to be very compelling to many obstetricians, and the practices soon became widespread.
In addition to DeLee's persuasiveness and his stature within the medical community, additional social factors may have increased acceptance of the practice. In the first four decades of the 20th Century, birth moved from the home into the hospital, and from lay attendants and midwives to the new specialty of obstetric physicians. This resulted in a rapid 'medicalization' of the birthing process, as physicians sought to study the process of childbirth, and intervene to improve maternal and fetal outcomes. This environment probably contributed to the rapid uptake of new interventions, including episiotomy.

Throughout the rest of the 20th Century, episiotomy was considered the standard of care by many American obstetric care providers. By 1979, episiotomy was performed in approximately 63% of all deliveries in the USA, with higher rates among nulliparas.[4] In the UK in the same era, episiotomy rates ranged from 14 to 96% among nulliparas and 16–71% among multiparas.[5] The purported short-term benefits for the parturient included its ease of repair compared with a spontaneous perineal laceration, improved postpartum pain and reduction in severe (third and fourth degree) lacerations. Additional long-term benefits were believed to accrue from decreasing the time that the perineum is stretched during birth, including prevention of pelvic floor relaxation, pelvic organ prolapse, sexual dysfunction, and urinary and fecal incontinence. The purported benefits to the neonate included prevention of asphyxia, cranial trauma, cerebral hemorrhage and mental retardation, as well as reduction in the incidence of shoulder dystocia.

The Building Controversy: Episiotomy & Severe Perineal Lacerations

The widespread adoption of episiotomy was not without objections. As early as 1948, Kaltreider and Dixon reported a large series of severe obstetric lacerations and noted their association with midline episiotomy.[6] However, it was not until the late 1970s and early 1980s that a significant body of work began to be published on the potential complications of episiotomy. In 1983, Thacker and Banta produced an excellent review of all the published data from 1860 to 1980 and concluded that there was poor evidence to support the routine use of episiotomy.[4] They found no evidence to suggest that episiotomy effectively reduces severe perineal lacerations or pelvic relaxation, and no evidence of benefit to the neonate. In contrast, they highlighted the risks of episiotomy including increased maternal blood loss, increased postpartum pain and increased dyspareunia. They concluded that there was a need for additional research, but that the routine use of episiotomy was unjustified and the risks of the procedure had been largely overlooked. Following their publication, there were an increasing number of prospective studies of episiotomy, as well as a greater focus on its risks.

With early evidence questioning the protective effect of episiotomy, further studies began to evaluate and compare 'routine' episiotomy (performed for essentially all nulliparous parturients) and 'restrictive' episiotomy (performed at provider discretion for maternal or fetal indications). A small study in 1984 compared routine use of episiotomy with more limited use in 181 nulliparous women.[7] The authors found that outcomes for women in both groups were generally similar, but that in the group for whom episiotomy was restricted, 21% had an intact perineum, and these women had the best outcomes with respect to pain and healing postpartum. The authors questioned the routine use of episiotomy; however, they concluded that, "the final decision (regarding episiotomy) can be made only by the accoucheur at the time of imminent delivery". Another small prospective study published in 1987 compared selective versus routine use of episiotomy.[8] This nonrandomized trial compared two groups of women: the first group were delivered by a single author using episiotomy only for fetal distress or operative vaginal delivery, and the second group were delivered by residents "at their own discretion". They found a significant decline in third and fourth degree perineal lacerations with 'selective' use of episiotomy. In fact, no severe lacerations occurred in any woman who had not had an episiotomy.

A large observational study published in Obstetrics and Gynecology in 1989 reviewed almost 3000 deliveries, and noted that while certain patient characteristics (nulliparity, larger infant birth weight) increased the risk of severe (third or fourth degree) lacerations, the greatest increase in risk was related to performance of a midline episiotomy, with an odds ratio (OR)of 8.9 compared with no episiotomy.[9] Interestingly, delivery by a physician, rather than by a trained midwife, also increased the risk of severe laceration more than twofold. A large review of historical data
published in 1990 (using data from 1959 to 1966) showed a four- to 12-fold increase in severe perineal lacerations among women undergoing midline episiotomy. The authors concluded that the risks of episiotomy should be evaluated in a randomized clinical trial.

Other studies continued to show an association of midline episiotomy and severe perineal lacerations. These investigators found that the most significant modifiable factor related to third and fourth degree lacerations was midline episiotomy, and they recommended curtailing its routine use.

In the aforementioned studies conducted in the USA, the vast majority of patients had midline episiotomies. However, several additional studies performed outside the USA examined the role of mediolateral episiotomy in prevention of severe perineal lacerations. The Argentine Episiotomy Trial, a large prospective randomized trial conducted from 1990 to 1992, found that while overall rates of third and fourth degree lacerations were low, there was a small decline when episiotomy use was restricted. Furthermore, they found reduced rates in need for any repair, in postoperative pain, and in healing complications and dehiscence in the ‘restricted’ group. Their rates of episiotomy were 83% in the ‘routine’ group and 30% in the ‘restricted’ group. They concluded that routine episiotomy should be abandoned, and that rates over 30% could not be justified.

More recently, two large retrospective studies evaluating risk factors for severe obstetric lacerations reached conflicting conclusions regarding the impact of mediolateral episiotomy. In 2006, Baumann and colleagues published a series of more than 40,000 deliveries in Germany where anal sphincter laceration had occurred (5.2% of all deliveries during the study period). In the logistic regression analysis, the risk factors most strongly associated with anal sphincter laceration included episiotomy and forceps delivery with ORs of 3.23 and 2.68, respectively. The authors concluded that iatrogenic factors, namely episiotomy and operative vaginal delivery, place a parturient at the highest risk of severe obstetric laceration. Conversely, a population-based retrospective series of over 284,000 deliveries from the Dutch National Obstetric Database published in 2001 reported a strong protective effect of mediolateral episiotomy against severe obstetric lacerations (OR: 0.21). The episiotomy rate in this study was 35.1%; however the incidence of third and fourth degree perineal lacerations was lower than published rates in countries of comparable socioeconomic status (1.94 vs 4–5%). The authors of this study concluded that mediolateral episiotomy may serve as a primary method of prophylaxis against severe obstetric lacerations.

Episiotomy & Long-term Clinical Outcomes

At the same time that the evidence was building regarding episiotomy as a cause of severe perineal lacerations, there existed separate lines of investigation into the sequelae of these lacerations as well as other long-term outcomes related to episiotomy.

Various studies have evaluated the impact of severe obstetric lacerations on the subsequent development of rectal incontinence. Several studies have demonstrated increased rectal incontinence during the first postpartum year in women with severe obstetric lacerations. However, recently published studies provide additional evidence for long-term consequences of severe lacerations in regard to rectal incontinence. Fritel et al. published survey results from a randomized trial comparing ‘routine’ versus ‘restrictive’ episiotomy and noted more frequent incontinence of flatus at 4 years postpartum in the ‘routine’ group. A study from the Netherlands in 2007 reported a 15- and 25-year follow-up on a small cohort of women with anal sphincter disruption during vaginal delivery. Of women with severe obstetric lacerations, 15% reported bowel incontinence compared with less than 1% of controls. Sorensen followed women for 5–10 years after delivery, and found that women with a fourth degree laceration were significantly more likely to have persistent incontinence of flatus and loose stools. Examination of these women revealed markedly lower sphincter pressures with squeeze. In 1998, Poen and colleagues found that even after ‘successful’ repair of a third degree laceration, approximately 40% of women had anal incontinence after 5 years.

In addition to the sequelae related to severe obstetric laceration, various studies have evaluated other consequences of episiotomy, including dyspareunia and sexual dysfunction, urinary incontinence and pelvic floor relaxation or prolapse. The largest study with long-term clinical outcome data is the West Berkshire Perineal...
Management Trial published by Sleep and Grant in 1987.[25] This trial randomized 1000 women to restricted versus liberal episiotomy during spontaneous vaginal delivery at a single center. Follow-up data were collected by survey at 3 years postpartum and the responses of 674 women were available for analysis. No statistically significant difference in the rate of dyspareunia or urinary incontinence was noted. Rockner and colleagues conducted the only other study with long-term outcomes data and reported no difference in the risk of urinary incontinence between women with and without episiotomy at 4 years postpartum.[26]

Several other studies provide intermediate-term clinical outcome data (between 3 and 12 months postpartum) regarding the impact of episiotomy on the development of dyspareunia, urinary incontinence or pelvic floor dysfunction. In a large prospective study, Klein et al. found that both immediately after delivery and at 3 months postpartum, women with median episiotomies reported more perineal pain than those with either an intact perineum or a spontaneous laceration.[27] Sexual function was better among women with intact perineums or spontaneous tears, and worse among women with episiotomies or severe (third or fourth degree) lacerations. The Argentine trial noted increased pain in the 'routine' episiotomy group and a large prospective trial study by Sartore et al. reported increased perineal pain and dyspareunia in patients with mediolateral episiotomy.[15,28] Various other small studies have made similar observations.[29,30]

The aforementioned study by Klein also evaluated urinary symptoms and pelvic muscle relaxation and noted no difference in urinary incontinence or prolapse between women with and without median episiotomy. However, electromyographic examination of the pelvic floor musculature demonstrated that women with either median episiotomy or severe perineal laceration had less recovery of muscle strength after delivery compared with women with intact perineums or first or second degree spontaneous lacerations. Sartore et al. conducted a prospective trial of 519 primiparous patients 3 months after term singleton spontaneous vaginal delivery.[28] Exclusion criteria included third and fourth degree perineal lacerations, pre-existing urinary or anal incontinence, or history of vaginal or anal surgery. Women with mediolateral episiotomy were compared with women with an intact perineum or spontaneous first or second degree perineal laceration. Rates of urinary incontinence and prolapse were similar in both groups; however, mediolateral episiotomy was associated with lower pelvic muscle floor strength both by digital exam and vaginal manometry.

Conversely, a recent commentary by DeLancey highlights a possible protective effect of mediolateral episiotomy on the risk of subsequent pelvic floor dysfunction.[31] In 2006, Kearney et al. published a case–control study of magnetic resonance images of the levator ani muscles in continent nulliparous women compared with women reporting de novo stress urinary incontinence that was persistent beyond 6 months postpartum and reproducible on physical examination. This study demonstrated that levator ani injury during vaginal delivery was associated with the subsequent development of stress urinary incontinence and pelvic floor dysfunction.[32] In the conclusion of this study, the authors reference two large cohort studies from the 1940s to 1950s that provide evidence of a significant decrease in the risk of levator ani damage and need for prolapse surgery with appropriately timed mediolateral episiotomy.[20,33] They conclude that mediolateral episiotomy may serve as a preventative strategy to decrease the risk of pelvic floor dysfunction by protecting against levator ani disruption at the time of delivery.

Therefore, uncertainty still exists regarding the long-term clinical outcomes and sequelae of episiotomy. Unfortunately, most studies report short- or intermediate-term outcomes and do not provide data beyond the first postpartum year. In fact, in a 2005 systematic review of episiotomy published in the Journal of the American Medical Association (JAMA), only two of the studies analyzed provide data beyond 1 year postpartum, leading the authors to conclude that "the overall level of evidence on long-term sequelae … is fair to poor."[34]

**Costs & Consensus**

Only one study has looked at the costs associated with episiotomy practice.[35] This study examined the implications for cost of care in Argentina if a restrictive episiotomy policy was universally adopted. Using a decision-tree model, the authors concluded that in each of two Argentinean provinces, there was a potential cost reduction of
US$11–20 per low-risk delivery if restrictive, rather than routine episiotomy, was adopted.

Given the large number of publications examining the risks and benefits of episiotomy, a *Cochrane* review was performed of the existing literature, first in 1999, and revised in 2004 and 2009. The authors found that the majority of studies were of such poor quality that they could not be included. However, their review concluded that episiotomy did not decrease rates of urinary incontinence, pain or sexual dysfunction and increased the rates of perineal laceration, suture placement and perineal repair and wound complications. They found no benefits of episiotomy to the neonate. They also found that of the three studies that examined midline versus mediolateral episiotomy, none were of high enough quality to be included in their review, and no conclusions could be drawn about episiotomy type.

An additional review was published in *JAMA* in 2005. By this time, in response to the growing concerns about the risks and complications of episiotomy, the practice had declined in the USA from of over 60% to 30–35% of vaginal deliveries. The *JAMA* review included a larger number of studies in their analysis than the *Cochrane* reviews, but came to identical conclusions. With regard to short-term outcomes, they concluded that episiotomy resulted in more pain, more need for pain medication and more severe lacerations than no episiotomy. With regard to long-term outcomes, they found the evidence was of poor quality, but that there was no improvement in urinary or fecal incontinence, no improvement in prolapse or sexual function, and greater dyspareunia with episiotomy. The authors concluded: "in the absence of benefit and with a potential for harm, a procedure should be abandoned. The majority of the data we have reviewed have been available for decades and thoughtfully reviewed by others. As in many discretionary procedures, practice patterns have been slow to change. However, in this instance, clinicians have been the primary agents to exercise choice to conduct or not conduct an episiotomy, rather than patients… evidence does not support maternal benefits traditionally ascribed to routine episiotomy. In fact, outcomes with episiotomy can be considered worse since some proportion of women who would have had a lesser injury instead had a surgical incision”.

With the publication of the *JAMA* and *Cochrane* meta-analyses, various professional bodies including the American College of Obstetricians and Gynecologists (ACOG; Washington DC, USA), the Royal College of Obstetricians and Gynaecologists (RCOG; London, UK), and the NICE (London, UK) have published consensus guidelines addressing episiotomy in current clinical practice. In 2006, ACOG published a Practice Bulletin concluding that median episiotomy is associated with higher rates of injury to the anal sphincter and rectum than mediolateral episiotomy, and they recommended the restricted use of episiotomy in clinical practice (Level A evidence). They also concluded that routine episiotomy does not prevent pelvic floor damage leading to incontinence and that mediolateral episiotomy may be preferable to midline episiotomy when clinically indicated (Level B evidence). NICE and RCOG published similar guidelines in 2007 recommending against routine episiotomy and advocating mediolateral episiotomy in clinically indicated cases. The NICE and RCOG guidelines also outline the recommended technique for performing a mediolateral episiotomy.

**Acceptance & Resistance among Practitioners**

There has been a steady decline in overall rates of episiotomy in the USA over the last four decades, and growing consensus in the literature that midline episiotomy was more harmful than beneficial, culminating in the *Cochrane* reviews and the *JAMA* article. However, new recommendations for restrictive use of episiotomy have not been universally accepted. A number of studies have shown that increasingly, the most important predictor of whether or not a woman has an episiotomy at delivery is who attends her delivery.

In 2000, Robinson and colleagues reviewed 1576 deliveries at the Brigham and Women's Hospital (MA, USA) between 1994 and 1995. They found that at this major academic institution there were wide differences in episiotomy rates based on the type of provider performing the delivery. Specifically, midwives had the lowest rates at 21%, academic faculty physicians had an intermediate rate of 33% and private physicians had a rate of 56%. No obstetric or demographic characteristics explained this difference in episiotomy practice. The strongest predictor of whether or not a woman underwent episiotomy was the type of provider who attended her delivery. No information
was provided about the training of midwives with respect to episiotomy.

In 2004, Howden and colleagues reviewed a much larger number of deliveries at an academic women's hospital over a 5-year period from 1995 to 2000. In all, they reviewed 27,702 deliveries with over 15,000 episiotomies. During the 5-year study period, the overall episiotomy rate declined from 59.7 to 45%. More striking than this, however, was the difference between academic faculty and residents and their private counterparts. Among the academic physicians, the average rate of episiotomy was 17.7%, and among private obstetricians it was 67.1%. After using logistic regression to control for demographic and obstetric characteristics of the two groups of patients, the authors concluded that having a private obstetrician attend a woman's delivery increased her risk of episiotomy more than sevenfold.

In 2006, another study compared private and academic deliveries at Lehigh Valley (USA) during 2001. In approximately 1000 deliveries over a 6-month period, the rates of episiotomy were 6% among patients delivered by the academic/resident service, and 26% among patients delivered by private obstetricians. The authors further stratified physicians by years in practice, and found that doctors in practice more than 15 years had higher rates of episiotomy than those in practice less than 15 years (32 vs 22%, respectively).

All of these studies were conducted within academic medical centers, and the fact that private physicians in practice at these centers were failing to adopt evidence-based delivery practices was concerning. In 2008, Gossett and Dunsmostor addressed the practice patterns of physicians in the community hospital setting. In this review of almost 3000 deliveries from 2004 to 2005, the authors found that the overall rate of episiotomy declined from 21 to 18%. More notable was the wide variation in individual provider episiotomy rates, which ranged from 2 to 43%. In this study, provider characteristics more strongly predicted episiotomy use than patient characteristics. Most predictive was a strong, linear correlation between years in practice and episiotomy rates. Providers in practice 10 years or less had episiotomy rates of approximately 15%, those in practice 11–20 years had rates of approximately 25% and those in practice over 20 years had rates of approximately 35%. Another interesting finding in this study was that women who were delivered by their primary physician, rather than a different physician on night call, were significantly less likely to undergo episiotomy (OR: 0.43). The authors concluded that individual provider characteristics, rather than patient characteristics or clinical scenario, were most important in determining whether or not a woman received an episiotomy.

A few more studies provide interesting insights into decision-making about episiotomy. Webb and Culhane showed a clear temporal pattern of episiotomy and other obstetric interventions. Episiotomies and other interventions to expedite delivery such as operative vaginal delivery were most likely to be performed mid-day, and least likely in the middle of the night. The authors posit that physicians may have multiple demands on their time during the day, and may therefore feel more pressure to accomplish delivery more quickly than they do at night. The same authors also found that episiotomy rates varied widely by hospital (from 20 to 73%), and that rates of severe perineal lacerations correlated with episiotomy rates (from 4 to 13%).

All of these studies concluded that additional education of obstetric providers, perhaps targeting nonacademic physicians, or those in practice longer, might decrease episiotomy use and decrease the complications associated with high episiotomy rates.

**Why Don't Doctors Follow Guidelines?**

The challenges of obtaining high-quality data to direct evidence-based care have been greater in obstetrics than in many other medical disciplines. For many years, all women were excluded from the majority of research studies owing to concerns about negative effects on pregnancy or developing fetuses. While this general ban has been reversed, it remains difficult to conduct prospective research in obstetrics for multiple reasons. First, any study of clinical practices must consider whether it is ethical to proceed if there may be increased risk to an unborn child. Second, pregnant women themselves may be more reluctant than other patient populations to participate in prospective clinical research for much the same reasons. Finally, since obstetrics generally has lagged behind other
disciplines in its efforts to have standardized, outcomes-based practices, there may be greater cultural barriers among obstetricians to changing practices based on new data.

In 1993, a Canadian study of low-risk deliveries over a 4-year period found that some trends in obstetric practice reflected current recommendations (including, in this case, a small decrease in episiotomy rates), and others, such as increased rates of induction and electronic fetal monitoring, were not based on current evidence.[44]

In 1995, Michel Klein described physician beliefs regarding episiotomy during an attempted prospective randomized trial of episiotomy.[45] In this publication, the authors note that those physicians who regarded episiotomy 'very favorably' performed more interventions to expedite delivery, and were also less likely to assign patients to a study arm. These doctors had difficulty limiting episiotomy use when patients were randomized to 'restricted use' of episiotomy. The authors concluded that physician beliefs influence not only clinical practice but also compliance with research protocols.

In 1998, a questionnaire mailed to family physicians and obstetricians found that only 40% felt that evidence-based medicine was "very applicable to obstetric practice".[46] Concerning comments from this survey included "obstetrics requires manual dexterity more than science", "evidence-based medicine ignores clinical experience", and that following guidelines could result in "erosion of physician autonomy". These views were described as obstacles to the adoption of evidence-based practices, and the authors recommended emphasis of critical analysis of the literature as part of medical education.

The following year, Cabana and colleagues published a review of reasons that physicians fail to change their practices in the face of new evidence or published clinical guidelines.[47] They found multiple types of barriers to practice change, including lack of awareness or familiarity with current recommendations, lack of agreement with the recommendations, lack of self-efficacy to make practice changes, inertia and external barriers to practice change. Of those physicians who did not agree with the practice recommendations, a variety of reasons were cited. Some physicians felt the evidence did not support the guidelines, some felt the recommendations were like a 'cookbook' or reduced physician autonomy, or did not apply to their patient population. Finally, some physicians had a "lack of outcome expectancy", or did not believe that making the recommended practice changes would improve clinical outcomes. While the authors provide a "differential diagnosis" of reasons that physicians fail to adopt new practices, they did not provide any recommendations for how to address these various barriers.

In addition, recent data from Greece highlight another potential reason for the delay in acceptance of evidence-based practice guidelines by obstetricians: differences in healthcare delivery systems and cultural approaches to care on provider practice patterns. In 2009, Grigoriadis et al. published survey results regarding the use of episiotomy and technique for perineal lacerations among obstetricians in Greece.[48] This study found that 51% of providers performed routine episiotomy for spontaneous vaginal deliveries, 89% performed episiotomy for operative vaginal delivery, and that lateral and mediolateral episiotomy were equally common. The authors note that the evidence for restrictive episiotomy use reflects North American and European data. They comment that the differences in the healthcare systems, provider and patient expectations, and the medical and cultural approaches to peripartum care may influence the perceived clinical efficacy and the acceptance and implementation of new evidence-based guidelines.

**Areas of Uncertainty**

While a substantial body of evidence and the recommendation of various professional bodies support restricted rather than routine use of mediolateral episiotomy with spontaneous vaginal delivery, data remain inconclusive regarding the use of episiotomy in the setting of operative vaginal delivery. A recent national survey of obstetric providers in the UK and Ireland reported a preference for routine episiotomy for forceps delivery and restricted use for vacuum delivery.[49] The majority of providers (65.5%) perceived the relationship between operative vaginal delivery and anal sphincter tears as protective. However, various other studies have reported conflicting results.
A retrospective study of 323 operative vaginal deliveries by Robinson et al. in 1999 reported an increased risk of severe perineal laceration in vacuum deliveries with episiotomy compared with those without episiotomy with a relative risk of 3.7; however, there was no effect of episiotomy on perineal laceration in forceps deliveries. A Scottish retrospective, population-based cohort study of over 2100 operative vaginal deliveries reported an increased risk of severe perineal laceration for operative vaginal deliveries with episiotomy relative to those without episiotomy (7.5 vs 2.5%; OR: 2.92). A study published by Kudish and colleagues in 2006 noted a synergistic effect of operative vaginal delivery and midline episiotomy on the risk of anal sphincter laceration. After controlling for age, ethnicity, birthweight and head circumference, the authors found that the joint use of episiotomy and forceps delivery was associated with a 20-fold increased risk of anal sphincter lacerations in nulliparous women and a 77-fold increased risk in multiparous women over spontaneous delivery without episiotomy. The authors concluded that this combination of operative procedures should be avoided whenever possible.

Recently, the British Journal of Obstetrics and Gynaecology published a series of articles with conflicting results in regard to the protective effect of mediolateral episiotomy performed during operative vaginal delivery. First, in 2007, de Leeuw et al. published a retrospective population-based study of over 28,000 operative vaginal deliveries from the Dutch National Obstetric Database. In this study, the overall rate of episiotomy was 79% in vacuum extractions and 89% in forceps deliveries. Mediolateral episiotomy was highly protective for severe perineal laceration with both vacuum and forceps deliveries with ORs of 0.11 and 0.08, respectively. The number of episiotomies needed to prevent one anal sphincter injury in vacuum extractions was 12 and in forceps deliveries was five. In their conclusion, the authors advocate for liberal use of mediolateral episiotomy with operative vaginal delivery.

A year later, Murphy and colleagues published results of both a randomized control trial and a prospective cohort study of mediolateral episiotomy at the time of operative vaginal delivery. A total of 200 nulliparous women were randomized to routine or restrictive episiotomy in the second stage of labor at the time when a provider determined that an operative vaginal delivery was required. Patients who did not desire randomization were recruited for the prospective cohort study (n = 1360 of which 1066 had episiotomy). In the randomized trial, routine episiotomy was not associated with a decreased rate of severe perineal laceration, primary postpartum hemorrhage or neonatal trauma; however, this pilot study was underpowered to demonstrate a difference in the primary outcome. The cohort study reported increased rates of postpartum hemorrhage, need for analgesia and perineal infection in the episiotomy group. Episiotomy did not impact the rate of severe obstetric laceration, shoulder dystocia or neonatal trauma. The authors concluded that episiotomy at the time of operative vaginal delivery may increase maternal risks without clear benefit and highlighted the need for a larger randomized clinical trial.

An additional complication in the study of mediolateral episiotomy, and a possible contributor to the mixed research data, is that not all 'mediolateral' episiotomies meet strict definitions of the procedure. In fact, one study demonstrated that only 46% of doctors and 33% of midwives were able to draw a pictogram of an 'ideal' episiotomy that started at the midline and had at least a 40° angle from the midline. A subsequent clinical study examined actual measurements of episiotomies performed. A total of 258 women agreed to participate, of whom 98 (41%) had mediolateral episiotomies. Of these, 58 were delivered by physicians and 40 by midwives. The investigators found that episiotomies cut by doctors were longer and deeper than those cut by midwives. Only 22% of episiotomies cut by doctors were truly mediolateral (between 40 and 60°), and none of the episiotomies cut by midwives met these criteria. The impact of operative technique may be substantial as an emerging body of literature provides evidence of a relationship between the angle of mediolateral episiotomy and the risk of anal sphincter damage.

These differences in actual and intended incision angle may in part explain the different outcomes seen in different trials of mediolateral episiotomy. Therefore, an important question remains unanswered: would the routine use of a technically appropriate mediolateral episiotomy performed at the time of operative vaginal delivery reduce the incidence of severe obstetric laceration?

Other areas of uncertainty with regard to the use of episiotomy include its impact on long-term pelvic floor...
relaxation, pelvic organ prolapse, urinary incontinence and dyspareunia. Data outlined in this article suggest that episiotomy may increase the risk of short- and long-term dyspareunia and pelvic floor relaxation, but may have no effect on the risk for subsequent urinary incontinence or pelvic organ prolapse. However, most trials provide only short-term outcomes and do not report data beyond 1-year postpartum. Additional prospective studies are required to provide additional data on long-term outcomes.

**Expert Commentary**

There is little doubt that the use of midline episiotomy for vaginal delivery does not provide any significant benefit to the parturient, either in the immediate postpartum recovery period or in longer follow-up. Theoretical improvements in postpartum pain and healing have not been shown to occur, and, in fact, women who undergo episiotomy report more pain than women with spontaneous lacerations. Furthermore, there is no evidence that midline episiotomy prevents either urinary or fecal incontinence or pelvic organ prolapse. In contrast, midline episiotomy significantly increases the risk of third and fourth degree perineal lacerations and increases the risk of anal incontinence from the immediate postpartum recovery until at least 5 years after delivery. Finally, no benefit to the neonate has ever been demonstrated with the use of routine episiotomy.

At present, there are inadequate data to properly evaluate the safety and efficacy of mediolateral episiotomy to decrease severe perineal lacerations. The existing data are conflicting and based on retrospective studies or small prospective studies. Large-scale, prospective randomized trials are needed to determine if mediolateral episiotomy can reduce the risk of third and fourth degree lacerations in both spontaneous deliveries and operative vaginal deliveries.

The wide variations in episiotomy practice by provider type, hospital type and even time of day are among the most concerning findings. The fact that decisions about obstetric intervention are based more on characteristics of the accoucheur than the patient or the clinical situation is unacceptable. Multiple studies show an urgent need for targeted education of obstetric providers, particularly those outside of academia and those who have been in practice longer. However, education alone may be inadequate, as some providers may feel that their personal judgment carries more weight than data from the medical literature. In order to improve compliance with current guidelines, providers may need additional incentives to change their practice behaviors. One method would be to give obstetric providers feedback about their own episiotomy rates as well as comparative data. Some hospitals are already beginning to track these data for their own physicians.

**Five-year View**

The risks of midline episiotomy seem clear. Studies of mediolateral episiotomy and its implications for severe perineal lacerations as well as long-term outcomes including dyspareunia, pelvic floor relaxation and prolapse are still needed. Any such investigation must include rigorous postpartum evaluations of the incisions to verify that they truly meet the definition of a ‘mediolateral’ incision. We anticipate that over the next 5 years, we will find a continued decline in episiotomy rates in the USA. Severe perineal lacerations are already tracked at the hospital level, and episiotomy rates are an obvious choice for third parties to track as a quality measure. These data may become publicly available (as hospital-wide laceration rates already are), and this increased scrutiny may provide an external incentive to providers to reduce unnecessary episiotomies.

The successful translation of evidence into clinical practice represents the most significant challenge for the coming 5 years. Interventions to aid the implementation of evidence-based guidelines may involve the utilization of simulation or quality improvement curricula to modify physician behavior. A growing body of evidence supports the impact of patient safety initiatives such as simulation or team training on the optimization of outcomes in obstetric emergencies such as shoulder dystocia or postpartum hemorrhage.[60,61] Many hospitals have implemented mandatory training programs which have reduced morbidity from these common obstetric events. Conceivably, this model could be applied to episiotomy. In addition, numerous studies, including a recent *JAMA* systematic review,
have evaluated the impact of quality improvement curricula on provider knowledge and clinical outcomes.\[62\] While data provide varied results, models exist where curricula translate into improved clinical outcomes. Importantly, a quality improvement curriculum should expand clinicians’ knowledge of and adherence to guidelines while providing a skill set for future self-directed implementation of change. Therefore, quality improvement curricula and simulation training may provide a novel means to not only implement evidence-based guidelines and improve patient care, but also provide a skill set that obstetricians could utilize to make similar practice modifications in the future.

With current evidence as our guide, the exhortation of Eason almost 20 years ago about attending a vaginal delivery still rings true: "don't just do something, sit there!"\[63\]

**Sidebar**

**Key Issues**

- Episiotomy does not decrease the risk of urinary incontinence and does not provide a protective effect on neonatal outcomes.
- Midline episiotomy increases the risk of severe (third and fourth degree) lacerations, and therefore the risk of long-term fecal incontinence.
- Both midline and mediolateral episiotomy decrease pelvic floor muscle strength and may increase dyspareunia when compared with spontaneous tears.
- Mediolateral episiotomy may decrease the risk of severe perineal lacerations. Uncertainty exists regarding the impact of mediolateral episiotomy on pelvic floor dysfunction or prolapse.
- There is evidence that not all healthcare providers perform technically appropriate mediolateral episiotomies. Additional training (or retraining) in this technique may be warranted.
- Changes in episiotomy practice have been rapidly adopted by clinicians in academic settings and younger physicians. Older physicians and those in community settings have not adopted current evidence-based practice at the same rates.
- Rates of severe perineal lacerations are already being collected by some hospitals as a quality measure. Prospective tracking of episiotomy rates should be considered, with regular feedback to healthcare providers about their own practices and the practices of their local and national peers.
- Both hospital and individual rates of episiotomy and severe perineal lacerations may be collected by third parties such as insurers or government agencies as quality measures, and these data may become publicly available. This may provide additional motivation for providers to limit episiotomy use.
- Simulation and quality improvement curricula may provide a novel approach to the implementation of interventions to educate obstetric providers and improve adherence to evidence-based clinical guidelines.

**References**

   •• Very well-written and lucid review of the early data; while the article is now 20 years old, their conclusions presage those of all later reviews.


• Current practice guideline from the American College of Obstetricians and Gynecologists (DC, USA), which summarized the evidence to 2006. Recommends restrictive use of midline episiotomy.

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Papers of special note have been highlighted as:
• of interest
  •• of considerable interest

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