Is it possible to predict or prevent third degree tears?

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Abstract

Objectives This paper reviews the causes anal sphincter injury during vaginal delivery. It emphasises that they are not usually the result of poor obstetric care. The role of the colorectal surgeon in their management is discussed.

Methods Medline was searched using the key words third degree tears, pregnancy, risk factors, prevention and recurrence risk. A hand search of journals and located articles was made. Two hundred and twenty three papers were identified, 84 are referenced.

Results The reported incidence of anal sphincter tears is usually between 0.5% and 2.5% of vaginal deliveries. Maternal factors such as parity and age and obstetric factors such as mode of presentation, the use of forceps and the size of the baby all influence the incidence of sphincter tears. Predicting tears in individual women is inaccurate and midwifery practices can do little to prevent them. Reducing pelvic floor morbidity by increasing the caesarean section rate would require that a large number of caesarean sections be done to prevent a small number of tears. The recognition of perineal trauma is improved by training. Accurate apposition of the sphincters with antibiotic cover and post-operative laxatives are the important technical aspects of the repair. Colorectal follow up helps to identify those women with symptoms and allows advice about the advisability of subsequent vaginal deliveries. A previous third degree tears increases the risk of a subsequent one, although the overall risk remains low. A second vaginal delivery after a third degree tear that has resulted in a functional deficit predisposes to worsening function. When there is no residual anatomical defect and no functional loss, there is no evidence of increased risk of incontinence following another vaginal delivery.

Conclusion Vaginal delivery will continue to be the main method of delivery and will continue to generate a low incidence of pelvic floor morbidity. The management of injury to the anal sphincter is facilitated by close co-operation between obstetricians and colorectal surgeons.

Keywords Anal sphincter, third degree tears, pregnancy, risk factors, prevention, recurrence risk

Introduction

Colorectal surgeons have an increasingly important role to play in the management of women who sustain an anal sphincter tear during labour. The identification and assessment of those women with symptoms of faecal incontinence following a tear enables appropriate treatment to be given. It also provides information that may assist in the planning of the method of future deliveries. This review explores why sphincter tears happen, emphasizing that their occurrence is not usually the result of poor midwifery or obstetric practice. It looks at the ability of the obstetrician or midwife to prevent such tears and discusses the role of the colorectal surgeon in their management.

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Method

A MEDLINE search was undertaken. The key words used were third degree tears, pregnancy, risk factors, prevention and recurrence risk. Two hundred and twenty-three papers were initially identified. Non-English papers and those dating from prior to 1994 were excluded unless they illustrated an issue not explored in more recent articles. The search was extended to papers in 2004. Randomised trials and large studies were favoured where possible. The computer search was accompanied by hand search of journals and reference lists of located articles. Eighty four papers are referenced.

Obstetric background

Maternal mortality dramatically fell during the twentieth century and the focus is now on reducing maternal morbidity, together with reducing perinatal mortality and

morbidity. Damage to the perineum is a relatively common occurrence during both spontaneous and operative vaginal deliveries. In the majority of cases either a first or second degree tear is sustained. These involve the perineal skin, vaginal epithelium and superficial muscles. Serious sequelae are infrequent.

Our understanding of the problem of more severe perineal trauma has been hampered by differences in the classification of perineal tears [1]. In the UK, a third degree tear used to be recorded only if the anal sphincter was completely disrupted and the rectal mucosa was breached. In the USA, a tear that involved the anal sphincter to any degree was classified as third degree, and one that involved the rectal mucosa was called fourth degree. This latter classification has become more universally adopted.

Anal sphincter tears are a relatively uncommon occurrence on any delivery suite. The reported incidence varies considerably but it is usually between 0.5% and 2.5% of vaginal deliveries [2–4]. They are an important risk factor for long-term anal sphincter dysfunction [5]. Up to 60% of women who sustain a sphincter tear are reported to experience symptoms of dyspareunia, perineal pain or anal incontinence [1,6]. These symptoms may not all be due to the effects of the tear itself. They can occur following any vaginal delivery and following emergency caesarean section, probably due to stretching of the pelvic floor muscles and damage to the pudendal nerves [7–9].

Risk factors

Some of the factors that contribute to obstetric perineal trauma are well documented. Primiparity [10–12], forceps delivery [12,13], a persistent occipitoposterior position [14] and a birth weight of more than 4 kg [2,4] are significantly associated with sphincter tears. Shoulder dystocia has been associated with an increase in both perineal and anal sphincter trauma by some [15], but not by others [16]. It may be the interventions that are required to resolve the shoulder dystocia which increase the risk.

Other predisposing factors are not so well known. Indian and Chinese women have a higher risk of sphincter tears, which is thought to be associated with a relatively short perineum [17,18]. The lithotomy position, with hip flexion and abduction, results in stretching of the perineum which may then be unable to stretch further as the fetal head encounters it [19]. A gestational age of more than 42 weeks is associated with an increased risk of sphincter tear. This may be because the hormonal changes in the post-term pregnancy result in changes in the physical properties of perineal connective tissue [10,17]. Induction of labour has been associated with a slightly increased risk of sphincter tears but the reasons are unclear [4,11]. A prolonged second stage results in an oedematous, fragile pelvic floor, which is then at greater risk of trauma [4,10]. A precipitate delivery, when there is less time for maternal tissues to adapt to delivery forces, is also associated with perineal injury [15].

Maternal age, at both ends of the reproductive age span, is another risk factor. In older women this may be related to changes in connective tissue [10,12,]. In teenagers it may be related to a lack of preparation for birth and the absence of a birth partner [20].

There is conflicting evidence about the role of epidural anaesthesia in the aetiology of anal sphincter tears. The use of epidural blockade is associated with the prolongation of the second stage of labour, which itself is associated with faecal incontinence due to pudendal neuropathy [21]. There is also a reported increase in sphincter tears with epidural anaesthesia due to an increased incidence of operative vaginal deliveries [11,13,22]. Studies by Fitzpatrick *et al.* [23] and Bodner-Adler *et al.* [24] reported no increase in sphincter tears with epidural anaesthesia in women undergoing spontaneous vaginal delivery. Combs *et al.* [18] postulated that epidural anaesthesia reduces the risk of sphincter trauma by relaxing the perineal musculature. They also suggested that local anaesthetic infiltration increases the risk of trauma by weakening the sphincter capsule and predisposing it to rupture. Jandér & Lyrenäs [12] reported that the use of any form of analgesia other than Entonox, including epidural, pudendal block, local infiltration and intramuscular opiates, was a significant risk factor for third degree tears. This may have been because those women who did not receive analgesia were the ones that had an uncomplicated labour and delivery.

Water births are increasingly in vogue. Otigbah *et al.* [25] reported that the use of water resulted in shorter labours and delivery times, and a reduced risk of third degree tears in primigravida. In all women there was a reduced need for analgesia.

Prediction and prevention

Awareness of the risk factors does not always help to predict which women will sustain a sphincter tear and tears occur in women without risk factors. Approximately one third of births are in primiparous women. Accurate antenatal determination of a baby's weight, particularly of a large baby, either by clinical examination of by ultrasound scan, is notoriously unreliable. An occipitoposterior position of the fetal head is probably present in about one in five women at the start of labour. In many of these women the fetal head rotates

to an occipitoanterior position, although this may not occur until late in labour or at the time of an assisted delivery. A persistent occipitoposterior position cannot be predicted. In the UK, the lithotomy position is usually only used for instrumental deliveries. The only reasonable alternative position for operative deliveries is the use of the birthing chair. This does slightly reduce the incidence of perineal trauma but also increases the incidence of postpartum haemorrhage [26,27].

Obstetric and midwifery practice

In view of the difficulty in prediction, can severe perineal trauma be prevented, or at least minimized, by obstetric or midwifery practices? The practice of self massage of the perineum in the antenatal period was studied prospectively by Shipman *et al.* [28]. They reported that there was a reduction in the incidence of perineal trauma following antenatal massage, particularly in women over 30 years of age. Labreque *et al.* [29] reported a higher incidence of intact perinea in women who undertook antenatal perineal massage prior to their first vaginal delivery. A commentary in the Lancet discussed the merits of antenatal massage [30], but this time consuming practice has not gained popularity.

Massage of the perineum during the second stage of labour, so as to thin out and stretch the tissue, has its advocates although there is no definite evidence of its value [31,32].

The practice of guarding the perineum, when the birth attendant's fingers support the maternal tissues whilst flexing the presenting part, is widely assumed to reduce spontaneous trauma. A randomised controlled study (HOOP) of 5500 women compared the 'hands on' (HO) technique of guarding the perineum, with the 'or poised' (OP) technique of leaving the fetal head to deliver unaided [33]. Whilst the primary outcome measure was the incidence of postnatal perineal pain, the study noted that there was no difference in the incidence of perineal trauma between the two groups. A similar prospective study of 1076 women reported that the risk of both episiotomy and third degree tear was greater in the 'hands-on' group [34].

Routine episiotomy is sometimes performed in the belief that it reduces severe perineal trauma, particularly in primiparous women. Midline episiotomy, which is the preferred practice in many centres in the USA, is associated with an increased incidence of anal sphincter tears [35,36]. The evidence concerning mediolateral episiotomy, the usual practice in the United Kingdom and the rest of Europe, is conflicting. A meta-analysis suggested that there is an increase in third degree tears in association with the liberal use of this form of episiotomy

[37]. On the other hand, a prospective study of almost 300 000 vaginal deliveries reported that the selective use of mediolateral episiotomy did protect against damage to the anal sphincter complex [4].

Maternal position during the second stage of labour influences the risk of perineal trauma. Data from a retrospective analysis of uncomplicated deliveries undertaken either standing ($n = 650$), or sitting ($n = 264$) position reported that the risk of sustaining a third degree tear was seven times greater in those standing to give birth [38]. The squatting position has also been reported to cause an increased incidence of third degree tears [12]. Both of these positions allow women to push very hard, whilst making it difficult for the birth attendant to control the delivery. A study by Shorten *et al.* [39] reported that those women who were delivered in the lateral (side lying) position had the lowest incidence of perineal trauma.

During the second stage of labour, women may be encouraged to bear down throughout a contraction in order to hasten the delivery. A prolonged second stage in which strong voluntary pushes are encouraged has been implicated in denervation injury [40]. Yeates & Roberts [41] reported that bearing down only with the involuntary urge was associated with less perineal trauma than bearing down throughout the contraction. In contrast, similar studies by Parnell *et al.* [42] and by Thompson [43] found no difference in perineal trauma between women who only pushed spontaneously and those who were directed to push throughout the contraction. The use of oxytocin to hasten the second stage has also been associated with sphincter tears [11,12]. It may be that the factors which slow progress in the second stage and lead to the use of oxytocin, such as inelastic vaginal tissues, predispose to trauma.

Instrumental delivery increases the risk of pelvic floor injury [44]. Vacuum (ventouse) delivery causes less trauma to the pelvic floor than obstetric forceps and is increasingly the instrument of first choice for assisted deliveries [45,46]. It is less likely than forceps to affect a delivery, especially with a large baby in a persistent occipitoposterior position [47]. This situation, when forceps may be needed to achieve a successful delivery, is precisely the situation in which there is a higher risk of a sphincter tear [48]. The availability of different vacuum cups may be helpful in increasing the effectiveness of vacuum extraction [49]. Combined use of different instruments, in comparison to the exclusive use of one, may increase the risk of perineal trauma [4,50].

The experience and training of the accoucheur may influence the incidence of perineal trauma. Women who have a normal delivery by a midwife are reported to have a lower incidence of perineal trauma than those delivered

by an obstetrician [16,39]. Combs *et al.* [18] compared the outcome of almost 3000 consecutive operative vaginal deliveries including forceps and vacuum deliveries. They found that neither the training nor the experience of the operator influenced the likelihood of an associated sphincter tear. The factors that led to the need for an assisted delivery were deemed to be the main determinants of trauma.

Future management

More caesarean sections?

If the sole concern were the preservation of the pelvic floor, then the concept of universal prophylactic caesarean section would seem a logical one. Some women request an elective caesarean for this very reason. A postal survey of 282 obstetricians in the London area, asked about the delivery method they would choose for themselves or their partner. Of the female obstetricians who responded, 25 (31%) stated that they would elect to have a caesarean section for an uncomplicated first delivery, many citing preservation of the pelvic floor as the reason for this request [51]. Over the last few decades there has been a gradual increase in the number of caesarean sections performed in the western world. The high caesarean section rate is now causing concern and has been described by a leading obstetrician as 'the most urgent crisis facing obstetrics' [52].

A caesarean section, when performed under regional anaesthesia with prophylactic antibiotics and thromboprophylaxis, is safer now than ever before. Even so, complications do still occur. Short-term risks include increased rates of postpartum haemorrhage, infection, pulmonary embolism, ileus and Mendelson's syndrome. The risk of hysterectomy secondary to haemorrhage is 10 times higher than that with vaginal delivery and the risk of maternal mortality is 0.4 per 1000 following caesarean section compared to 0.025 per 1000 with vaginal birth [53,54]. Longer-term morbidity includes adhesion formation and chronic pain. In subsequent pregnancies there is the risk of uterine scar rupture and placenta accreta. Adhesion formation can lead to difficulties during future gynaecological surgery. Neonatal morbidity is also increased following elective caesarean section, with a greater incidence of transient tachypnoea and respiratory distress syndrome [55].

If morbidity due to perineal trauma is to be reduced by increasing the caesarean section rate, huge numbers of caesarean sections would need to be performed to prevent a small number of sphincter tears. These would generate their own morbidity and would have major economic implications for health-care providers [56].

Even if all babies were born by elective caesarean section, the problem of postdelivery faecal incontinence would still exist. MacLennan *et al.* [57] reported the results of an Australian survey of 4400 households, randomly selected and questioned about pelvic floor disorders. Disorders were common, associated with female gender and parity, but their prevalence was not reduced by caesarean section rather than spontaneous vaginal delivery. Lal *et al.* [58] compared the postpartum anal function of 184 primipara delivered by caesarean section and 100 delivered vaginally. Symptoms of incontinence at 10 months postpartum were found in 8% of those who had delivered vaginally and 5% of those who had a caesarean section. The difference did not reach statistical significance. It seems likely that the changes that occur in pregnancy to the properties of collagen and other connective tissues and, perhaps, an inherited susceptibility, may be factors in the aetiology of postpartum faecal incontinence.

Postpartum management

The accurate identification of perineal tears by midwives and obstetricians is very important if perineal trauma is to be managed in the optimal way. Training and continued education are clearly important [59,60]. It was our impression that when a perineal trauma audit was started in our hospital, the heightened awareness of the importance of accurately defining the extent of perineal tears resulted in more sphincter tears being recognized [61].

Primary repair of the sphincter and associated genital tract lacerations is usually performed shortly after the delivery by the duty obstetrician. It has been suggested that colorectal surgeons may be better than obstetricians at repairing third degree tears [60,62,63]. There have been no randomised-controlled trials comparing the results of repairs by these two groups of specialists. Obstetricians have the advantage of being available immediately after the delivery, when the vascularity of the perineum and perivaginal tissues is most favourable [64]. They are also more familiar with the repair of other aspects of genital tract trauma. By no means all colorectal surgeons perform elective anal sphincter repairs and it would be an unusual hospital that could provide an on call rota of colorectal surgeons with the necessary experience of elective cases to cover for the acute cases. In a prospective audit of the outcome of 53 third and fourth degree tear repairs in our unit, all were repaired by the on-call obstetrician. The results did not indicate that there was a problem with the technical quality of the repairs, and we did not change our practice as a result of the audit [61].

Differing techniques of sphincter repair have been studied [65,66]. A randomised controlled study comparing anal function following an end-to-end approximation technique with that following an overlapping repair, found no difference between the groups in the short term [67]. The importance of long-term data in this context is emphasized by the results of an audit from St Mark's Hospital of the sphincter function of 46 women who had a secondary sphincter repair using the overlapping technique. In some cases anal function deteriorated several years after the repair [68]. At the present time, accurate apposition of the torn ends of the sphincters with the use of antibiotics to prevent infection and laxatives to avoid constipation should be regarded as the most important technical aspects of the repair [69,70].

Follow-up

Colorectal surgeons can play an important role in the follow-up and subsequent management of women who have sustained perineal trauma during childbirth. Women with anal incontinence may not seek medical advice [71,72]. A survey from Switzerland reported that only 20% of women attending a specialized clinic with faecal incontinence had discussed their symptoms previously with a physician [73]. More women might seek medical help if they were better informed about the problem [74]. Follow up in the colorectal clinic is one way in which women can be given more information. It ensures that women with symptoms are identified and enables reassurance to be given to those women without symptoms. All have the opportunity to discuss the risks of repeat trauma with subsequent deliveries.

In the United Kingdom there is a wide variation in the way in which women are followed up after an anal sphincter tear [75]. In our hospital, an appointment in the colorectal clinic is arranged for all women who have sustained significant perineal trauma. Clinical assessment, with calculation of the 'Cleveland Clinic Incontinence Score' [76] is performed and an endoanal scan is arranged. Women with either symptoms or with a sphincter defect on their scan, remain under review. The attendance rate is about 80%. Our data, like that of Walsh *et al.* [62], indicate that about 7% of women have significant symptoms at this time. Not all women with sphincter damage request immediate surgery. Some find it more convenient to cope with their symptoms until their baby is older [61].

Subsequent deliveries

An important question for women who have sustained perineal trauma during childbirth is whether they are at increased risk of sustaining another sphincter tear with a subsequent vaginal delivery and whether further deliveries will have an adverse effect on anal function. Payne *et al.* [77] presented retrospective data from Oklahoma on 1741 women who had had two consecutive vaginal deliveries. The 176 women in the series who had sustained a third degree tear during their first delivery were 3.4 times more likely to sustain further sphincter trauma during the second delivery than those in whom there was no sphincter tear with the first delivery. The very high incidence of sphincter trauma in this series (10%) may have been related to the use of midline episiotomies and it is difficult to know how applicable these data are to European practice.

Harkin *et al.* [78] reported a series from Dublin of 20 111 consecutive vaginal deliveries in which midline episiotomy was not used. A sphincter tear occurred in 342 (1.7%) women, of whom 45 went on to have another vaginal delivery; 2 (4.5%) of these sustained a second sphincter tear. Both recurrent injuries occurred in asymptomatic women and recurrence was not predictable using predelivery anal physiology testing.

Bek and Laurberg [79] reported a series from Denmark of 56 women who had sustained an obstetric anal sphincter tear and who went on to have a subsequent vaginal delivery. Twenty-nine (52%) had no symptoms of incontinence after the first delivery and none of these developed long-term symptoms after the second delivery. Twenty-three (41%) had transient symptoms after the first delivery and 4 of these had persistent symptoms after the second delivery. Four (7%) had persistent symptoms of anal incontinence after the first delivery. The symptoms worsened in one of these after their second delivery and remained unchanged in the other three.

Fynes *et al.* [80] studied the effects of a second vaginal delivery on anorectal physiology and incontinence. Most women with impaired continence following their first delivery noticed deterioration in their symptoms following their second delivery. Women who had a large defect on endoanal scan or a small squeeze pressure increment on anal manometry were particularly at risk.

Sengali *et al.* [81] reported a series in which 114 women who had sustained an anal sphincter tear during a previous delivery were assessed. A second vaginal delivery was associated with worsening symptoms if the tear had been fourth degree but not if it had been third degree. De Leeuw *et al.* [82] reported the findings of a similar study from Holland in which 147 women who had sustained a third degree tear were assessed using a postal questionnaire. A subsequent vaginal delivery did not increase the prevalence of anal incontinence. By contrast, Fornell *et al.* [83] in a smaller study from Sweden, reported that a subsequent vaginal delivery following an

obstetric anal injury increased the risk of flatus incontinence but not of incontinence to solid or liquid stool.

The low incidence of sphincter injuries, both overall and following a previous sphincter tear, means that the number of second tears in published series is small and definite conclusions cannot always be drawn. A previous third degree tear does seem to increase the risk of a subsequent one, although the overall risk to the individual woman remains low. A second vaginal delivery after a third degree tear that has resulted in a residual sphincter defect or symptoms of dysfunction does seem to predispose to worsening function. Currently there is no consistent evidence that those women whose tears have fully healed and who have no symptoms of anal dysfunction are at increased risk of long-term incontinence if they have a subsequent vaginal delivery.

Many factors influence the final decision about the method of subsequent delivery. It is an individual decision taken between the woman and her obstetrician. The colorectal surgeon can contribute important information to assist in this decision by making a careful assessment of anal function prior to any subsequent pregnancy. Our policy is to advise women with symptoms of faecal incontinence, or with evidence of significant damage to the anal sphincters on endoanal sonography, of the potential risk of worsening incontinence with a further vaginal delivery. These women usually, but not invariably, opt for an elective caesarean section. Women with neither symptoms nor signs of sphincter damage on endoanal scan are reassured that, based on current evidence, their risk of incontinence following a further vaginal delivery is small [84].

Conclusion

Vaginal delivery remains the safest and most cost effective method of delivery. Vaginal deliveries will continue to be a major part of midwifery and obstetric practice for the foreseeable future. Even with good practice, a small number of anal sphincter tears will be sustained. If carefully repaired, the majority of these heal without significant sequelae. Routine follow-up in the colorectal clinic identifies those women with symptoms of faecal incontinence. It enables timely and appropriate treatment to reduce long-term morbidity and helps both the women and their obstetricians to make informed decisions about subsequent deliveries.

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