Review

How to Avoid Becoming a Risk Factor of Fecal Incontinence Due to OASIS – a Narrative Review

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Review

How to avoid Becoming a Risk Factor of Fecal Incontinence due to OASIS—A Narrative Review

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Abstract: Third and fourth-degree anal sphincter injuries are among the most severe traumas women can experience during childbirth, often leading to lifelong continence issues. Despite extensive research, current repair techniques are often inadequate, failing to provide long-term solutions. Women with previous severe injuries face a higher risk of recurrence in subsequent deliveries, making caesarean sections a safer option in many cases. The existing WHO classification system is outdated, as it doesn't account for injuries to muscles like the levator ani, which are crucial for continence. Effective repairs require skilled surgeons and often involve more than just fixing the sphincter. Smaller hospitals may not have the necessary expertise and resources for these complex repairs. Delaying repairs to allow specialists to perform them can be just as effective as immediate repairs. Comprehensive care that includes thorough anatomical knowledge and surgical skill is essential. As maternal age increases and birth rates decline, it's crucial for specialized centers to handle severe perineal injuries to ensure the best outcomes and long-term care for patients.

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Introduction

Third and fourth-degree anal sphincter injuries, the most severe peripartum traumas in women. The most severe consequences of the trauma, such as continence disorders, often persist throughout the woman's life (Barbosa et al., 2021; Cornelisse et al., 2016; Guzmán Rojas et al., 2018; Halle et al., 2016; Nilsson et al., 2016; Pla-Martí et al., 2022; Schütze et al., 2021). The literature is replete with publications addressing peripartum perineal tears, primary repairs of sphincter injuries and the various aspects of post-repair anal or fecal incontinence, emphasizing the importance of this issue.

Despite detailed literature descriptions, repairs of a damaged perineum are characterized by limited effectiveness, including long-term efficacy (Evers et al., 2012; Frudinger et al., 2008; Guzmán Rojas et al., 2018; Halle et al., 2016). Perineal tearing, especially with complete sphincter damage such as grades IIIb-IV according to the Sultan scale, usually worsens with time. This complication occurs rarely, affecting 5.7% of deliveries (Jha & Parker, 2016), and the risk of it should be considered individually for each patient due to its severity.

From a practicing obstetricians' perspective, we have to come to terms with the fact that this few percent of women giving birth are always at risk of and will experience perineal tearing, including severe cases, despite preventive measures. The consequences often include continence disorders and a significant deterioration in quality of life also regarding necessity of rehabilitation, surgery, and medical supervision related to OASIS.

Despite broadening of knowledge regarding risk factors, the repair techniques are imperfect, and results do not meet the needs of women nor doctors nowadays.

This paper aims to characterize the issue of fecal/anal incontinence following OASIS repairs. Additionally, it seeks to identify the scenarios where limited practical knowledge contributes to the risk of the complications. Such approach is not commonly found in the existing literature, yet, in the

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author's view, they are essential for delivering appropriate care to patients with childbirth-related sphincter injuries.

The paper focuses on the following aspects of the management of 3rd and 4th-degree perineal tears:

- recurrent OASIS
- pitfalls of current WHO classification
- surgical techniques
- where to operate perineal lacerations
- surgical training
- human factors
- delayed primary repairs

Recurrent Oasis

The risk of recurrent OASIS in subsequent natural childbirth is slightly higher when compared with first vaginal delivery (Faltin et al., 2001; Jangö et al., 2017), the studies highlight that each subsequent perineal injury in a patient correlates with worsened continence. This means that, particularly for patients with third and fourth-degree perineal injuries, an act as physiological and natural as childbirth can irreversibly decrease their quality of life through fecal incontinence, sexual dysfunction and even influence the family planning. It is essential to note for patients with third and fourth-degree perineal injuries, caesarean delivery remains the only scientifically recognized and reliable option that does not worsen continence.

Patients who have experienced OASIS must have had contributing factors that caused it, therefore it's important to inform patients with third and fourth-degree perineal injuries about the high risk of worsening continence due to natural childbirth after sphincter damage, regardless of whether perineal tearing occurs during the subsequent delivery or whether the risk of OASIS is the same (Levin et al., 2021).

In any case, the patient should have a decisive say in how the delivery is conducted. From a medical perspective, it is essential to realize that reducing the upward trends in caesarean sections should not be at the expense of patients for whom not performing a caesarean section would significantly statistically lead to worsening continence.

Childbirth for patients who have previously experienced perineal damage and wish to give birth naturally should take place in facilities with resources available for primary perineal repairs. Patients who, despite previous third and fourth-degree sphincter damage, want to give birth naturally must include this fact in their medical documentation for legal reasons, necessarily considering the possibility of worsening continence.

Given the high expectations for the quality of care in delivering births, combined with often incorrect patient perceptions that childbirth is always physiological, we are increasingly exposed to legal claims due to consequences of perineal tearing - fecal and anal incontinence.

In the author's opinion, it is crucial to change obstetricians' approach to specific patients with risk factors without referring to statistics and recognizing that adverse actions affect a small percentage of patients in some cohorts. After a perineal injury occurs, the patient will be little concerned with statistics since she is the one affected by this severe condition.

This established knowledge requires a dedicated obstetric approach:

1. Patients with 3rd and 4th-degree perineal injuries should be informed about the risk of re-injury and its consequences, particularly for fecal or anal incontinence. They should be given the freedom to choose the method of childbirth, including caesarean section.
2. Those patients who, after third and fourth-degree perineal injuries, decide on natural childbirth should - after documenting - give birth in hospitals where doctors are readily available who actually and practically deal with perineal injuries around the clock, ensure continuity of proctological supervision and comprehensive counselling and treatment after these injuries.

This means that in the group of patients with third and fourth-degree perineal injuries according to the Sultan scale, we can become the risk factor of sphincter injury and its consequences when:

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- during the subsequent delivery, incorrect information is provided to the patient about the possible consequences of another natural childbirth or
- when a patient with a history of perineal laceration decides on natural childbirth - lack of a specialist who deals with the surgical treatment of perineal injuries, including care for the patient after this repair; this note concerns patients who have already undergone anal sphincter damage where repairs are technically very demanding.

Pitfalls of the Current Who Classification

The commonly used Sultan scale adopted by WHO and present in scientific research pertains only to anal sphincter injuries (Sultan, 1999). It does not include another occurring injury of the levator ani muscle (LAM) or avulsion injuries of the vaginal vestibule that can occur, especially in the case of operative vaginal deliveries (Valsky et al., 2016). Since the outcome of perineal tearing for a patient is some form of fecal incontinence, with the current state of knowledge (Heliker et al., 2021), it would be appropriate to review the classification of perineal injuries to include other aspects important for continence - for example, LAM damage, which, according to the literature, may occur in up to 35% of women with OASI (Doxford-Hook et al., 2023). Specific signals for the necessity of changes in classifications may come from studies reporting on injuries of the LAM or the puborectalis muscle, which plays a significant role in fecal continence (Doxford-Hook et al., 2023; Melendez-Munoz et al., 2020).

Currently, there are no widely accepted classifications that allow precise determination of complex perineal injuries (e.g., with LAM damage and avulsion of the vaginal vestibule). Such a classification would enable accurate representation of injuries, which often do not fit within the WHO's standard perineal damage grades I-IV as adapted from the Sultan scale. A more detailed statistical analysis would better identify risk factors for worsening continence.

The existing classification system has limitations as it tends to oversimplify, with regards to current knowledge, morphologically diverse injuries into just two or four categories (III, IV, or IIIa, IIIb, IIIc, IV). This oversimplification does not accurately reflect the complexity of severe injuries occurring during childbirth and does not account for the range of surgical interventions required for proper management.

Meanwhile, in today's state of knowledge, the above classification, although it refers to sphincter injuries, certainly does not reflect the scope and complexity of the most severe injuries occurring during childbirth, nor does it translate to the range of surgical actions necessary for the proper management of these injuries. This leads to a superficial approach to the topic of perineal injuries - not only for appropriate statistical reasoning and concluding but also for managing perineal injuries. Often, more than simply repairing the damaged sphincter is required. In the case of complex perineal injuries, a comprehensive and effective repair may require, for example, repair of LAM or levatorplasty and anatomical reconstruction of the perineum to maintain the Parks' angle.

Everyone involved in primary repairs of severe perineal injuries knows the significance of the imperfections of the commonly used WHO classification: these are diverse injuries, and treating the sphincter damage alone constitutes only part of a comprehensive repair.

These observations show that in specific degrees of perineal damage, merely performing a repair according to the scope of the injury as commonly classified may be insufficient and lead to worsening continence.

The lack of a recommended scale for assessing perineal injuries considering the state of knowledge means that there is no comprehensive ability to accurately describe the severity of perineal damage of LAM - e.g., after operative deliveries, when there is a disruption of the continuity of the rectum without damaging the sphincter complex or avulsion injuries of the vaginal vestibule or rectal avulsion.

A division considering the current state of knowledge should also emphasize the differences between <50 and >50% of external anal sphincter (EAS) injuries (IIIa, IIIb, according to Sultan) and full EAS injuries, regardless of internal anal sphincter (IAS) damage. In the current classification, each incomplete EAS injury requires a different repair technique, usually end-to-end, i.e., the overlapping

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repair technique may be used only in total EAS disruptions. Due to this imprecision between the commonly used damage scale and the technically justified aspects and possibilities of surgical repair at total or partial EAS disruption, the literature has raised the issue of the repairs' effectiveness by end-to-end and overlapping techniques (Farrell et al., 2012; Quiroz & Wild, 2011; Tjandra et al., 2003).

Thus, we can unwittingly become the risk factor of fecal incontinence by assessing damage only according to the Sultan scale - overlooking, among other things, LAM damage, which requires excellent knowledge of anatomy and surgical techniques for its management.

Surgical Technique

In the current classification of perineal injuries, the literature focuses on repairing the external anal sphincter (EAS) and internal anal sphincter (IAS), emphasizing the importance of correct repair techniques.

In professional literature there are many works on surgical aspects of primary sphincter injury repairs, including end-to-end and overlapping techniques (Abramov et al., 2008; Farrell, 2011; Tjandra et al., 2003). These are usually published by specialists or centers specializing in repairing severe perineal damage or by teams routinely dealing with this issue.

Based on current knowledge, the overlapping repair technique is advocated for complete disruptions of the EAS, as completely torn ends of the sphincter, even when best approximated by the end to end technique, can lead to denervation, atrophy, and scarring, resulting in long-term quality of sphincter injury repairs and fecal incontinence. While practitioners using the end-to-end treatment criticize overlapping technique for necessitating muscle preparation and causing further damage, the literature data are unequivocal in supporting the practical outcomes (Farrell, 2011). The overlapping technique is justified only in cases of complete disruption of the sphincters. It cannot be questioned when obstetric trauma damage has caused EAS delamination, creating conditions for the safe application of the overlapping technique.

The repair of EAS aims to restore the appropriate length of the anal canal (Norderval et al., 2012), often requiring levatorplasty.

A satisfactory long-term effect of the primary repair operation requires repairing both EAS and IAS, as mere EAS repair with concurrent IAS damage is associated with flatal incontinence and soiling. Therefore, identification of IAS damage is required intraoperatively, and adequate IAS repair must be performed (Andrews et al., 2009a; Briel et al., 1998; Cattani et al., 2019; Fehlmann et al., 2021).

Repairing LAM injuries is necessary for successful perineal injury repair at birth, as these injuries accompany up to 35% of OASIS cases(Doxford-Hook et al., 2023). The lack of LAM repair contributes to the deepening of incontinence and a significant increase in the percentage of incontinence. LAM repair during childbirth is facilitated by easy access (pelvic tissue elasticity), but it can involve substantial bleeding.

The surgeons expertise is a critical factor in the success of the repair:

- mastering both EAS repair techniques, including proper injury identification and correct qualification for management, including levatorplasty when required
- recognizing and treating IAS damage
- recognizing and treating LAM damage.

Where to operate perineal lacerations?

The repair of perineal injuries requires a high level of precision and must be performed in an operating room. Adequate patient positioning, good lighting conditions, and regional or general anesthesia, depending on the extent of the injuries are essential. Assistance from a specialist in perineal repair is also preferable.

Birthing beds do not allow for proper patient positioning and exposure of the anorectal area, which is crucial for the visibility of the surgical field and accurate identification of perineal structures.

Primary perineal repair is an operation that is particularly encouraging for repair - it is possible to get an excellent view of the perineal tissues, which possess above-average elasticity because of progesterone. However, physiological childbirth leads to congestion in the perineum and significant

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intraoperative bleeding, including muscles. The fundamental problem with this bleeding is that haemostasias should be achieved simultaneously with precise suturing of muscle injuries, using minimal or almost no electro-surgical methods to avoid further iatrogenic damage to the already damaged muscles.

It is technically challenging to repair perineal injuries, even for experienced operators. Comprehensive and professional perineal damage repair goes beyond the commonly understood sphincter repair among many doctors. Often, only the external anal sphincter (EAS) is addressed using any technique. Attempting to manage perineal injuries on birthing beds is directly associated with a lack of knowledge about the possible extent of injuries during childbirth. With current knowledge, the extent of potential soft tissue injuries at birth completely rules out their assessment and management in the conditions of a delivery room and birthing bed. It is important to note comprehensive management of perineal injuries includes the recognition and management of internal anal sphincter IAS and LAM injuries.

Applying learned perineal injury repair techniques under incorrect resource and equipment conditions, such as outside the operating room, without proper lighting and anesthesia, bare higher risk for the patient. Knowing the appropriate techniques and management of perineal injuries but applying them in an incorrect location other than the operating room is a risk factor for repair failure or incomplete repair, leading to suboptimal outcome.

Repair of Perineal Lacerations: Training vs Reality

Childbirth does not necessarily occur in large centers where several thousand deliveries take place annually and where, statistically, there are dozens of patients with severe obstetric perineal injuries. In such hospitals, frequent damage to perineal structures during childbirth necessitates the availability of teams trained in repairing perineal injuries. However, in smaller hospitals with only a few hundred births a year, after excluding simple type IIIa injuries, it turns out that severe perineal injuries occur in only a few patients annually. The rarity and randomness of these injuries significantly hinder the acquisition and maintenance of proficiency in their management.

Despite variations in detailed statistics on the occurrence of perineal injuries, numerous studies have confirmed that the severity of the sphincter injury is linked to worse continence outcomes. However, severe perineal injuries are statistically rare, and it is these severe injuries that have the most significant long-term effects on patients. While theoretically any doctor can manage such injuries, patients benefit most when these operations are performed by a doctor experienced in repairing such injuries.

Defining the learning curve for perineal repair operations is challenging. This is due to the variability of cases and the lack of an immediate, specific effect of the repair. Additionally, training usually only covers the repair of the EAS, ignoring more complex structures like the IAS and LAM.

Many courses on EAS repair use animal models that are not anatomically related to perineal structures, such as beef tongues (Patel et al., 2010; Sappenfield & Tunitsky-Bitton, 2021). Completion of such a course does not guarantee accurate management of a perineal injury, including the IAS and LAM.

From the perspective of a healthcare professional dealing with perineal injuries, the most challenging factor in surgical practice managing severe perineal injuries is bleeding from the torn muscles, including EAS and LAM. These conditions cannot be replicated during training. The lack of practice or training only in simulated conditions results in attempting hemostasis using extensive coagulation (usually ineffective) or placing wide sutures, which traumatizes muscles even more. This alters the anatomical conditions in the surgical field, making effective anatomical repair difficult.

Operator may become a risk factor of ineffective repair when the repair of perineal damage is not undertaken routinely or only performed after simulated conditions training. The overall effectiveness of sphincter repairs after primary repair, as assessed by postoperative ultrasound, is approximately 70% (Kirss et al., 2016). This is additionally important because, despite anatomical repair, the correct functional effect is often not achieved due to the denervation of the sphincter

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muscle. Professional management of perineal injuries also includes the recognition and repair of IAS and LAM injuries – which are usually not covered at all in repair training.

The Human Factor

The successful initial repairs of perineal injuries by specialized medical professionals lead to the best long-term outcomes. Most of the published research on this topic comes from large medical centers, but many women give birth in smaller facilities.

The research evaluating physicians' self-assessment of their skills and knowledge of perineal repair techniques is significant when looking int confidence in identifying and repairing OASIS (Abdelrahman et al., 2019; Best et al., 2012; Narayanamoorthy et al., 2023). Meanwhile, a common topic regarding skills is even the correct identification of intrapartum perineal injuries, a step that is crucial for proper repair. There can be no correct perineal repair if the repairer does not reconstruct and understand the mechanism of the injury they must manage. Operators handling perineal repairs know injuries to soft structures rarely look like the illustrations or fixed photographs. This is particularly true for the site of EAS damage, considering its connection with the LAM and its relation to the other pelvic muscles.

Only one study attempted to quantify the extent of training required to practically apply acquired skills of EAS repair to clinical practice (Andrews et al., 2009b), being around 20 repairs, of which five were supervised. This number of EAS repairs is not enough in managing severe perineal injuries. It cannot be ruled out that the outcomes of perineal injury repairs presented in the literature seem acceptable due to the classification of complete and partial sphincter injuries (IIIb) together.

Complex obstetric injuries are not familiar enough for obstetricians or surgeons in every hospital where deliveries take place to specialize in them. This obvious fact is only touched upon by a small number of studies that present the actual conditions of perineal injury occurrence: during childbirth, especially in smaller centers, there may be a lack of doctors not only with theoretical skills to manage sphincter injuries but also with a practical lack of these skills. Additionally, it should be emphasized that currently, in the EU, the number of births is decreasing, and the age of birthing women is increasing, which is a prognostic factor for the occurrence of intrapartum perineal injuries.

It's important to note that effective repair is considered as such when it results in minimal patients' inconvenience in terms of maintaining solid and liquid stool continence (note: flatal incontinence is a much lesser inconvenience, though quite common with natural childbirth). Proper repair of perineal injuries – EAS, IAS, and LAM requires a deep understanding of the physiology of these structures for maintaining solid, liquid, and flatal continence. Such repairs, even performed by specialists in this field, are characterized by limited effectiveness and decline over the long term despite surgical proficiency in this anatomical area.

Understanding the severity of the injury experienced by a woman is expressed, among other things, by ensuring constant and readily available postoperative care for the patient, including enabling quick visits after leaving the hospital in healthcare systems where they are usually difficult to achieve.

These observations lead to the conclusion that, with the current state of knowledge, the management of intrapartum perineal injuries should be the responsibility of a group of specialists focused on this. There should not be a general belief that every obstetrician should perform such repairs without persistent training or based on a course in simulated conditions. This observation is even more justified if the facility does not have the appropriate infrastructure to continue ambulatory care.

Delayed Early Repairs and Secondary Repairs

In cases of severe perineal injuries, rather than expecting the hospital where the patient gave birth to perform the repair, it might be beneficial for the patient to delay the repair and only control the bleeding. After this, immediate transfer to a center where teams routinely handle perineal repairs or consulting with the patient at such a center is recommended.

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Supporting this approach is the fact that perineal repairs are operations that should be flawlessly performed the first time and that delaying the repair for even 12 hours does not worsen the long-term outcomes (Ismail, 2008). This time in some cases can be prolonged up to 72 hours (Soerensen et al., 2008)

For an analogy, let's consider injuries to the upper limb. Many of them can be treated in any hospital. Yet, the severe ones, or those requiring replantation, usually require management by a dedicated team of specialists who serve a large part of the country, even though, in theory, limb replantation surgically involves only skilled yet basic surgical procedures. The same should apply to perineal injuries: they should be repaired by teams trained in managing this area of the body. Note that, unlike the upper limb, the perineum is an unpaired structure.

The surgery of complex perineal lacerations should not be expected to be done in any hospital where such damage occurs so as not to put the patient and a doctor at risk of the consequences of OASIS.

The same principles should apply to all failures of primary repairs of perineal lacerations. These operations demand the highest surgical proficiency and may lead to more complications. However, they remain a viable option for patients seeking to avoid the consequences of a failed initial repair, such as incontinence. Therefore, these patients would benefit from being referred for management of primary repair failure.

In summary, carrying out perineal injury repairs without sufficient resources increases the risk of failure. If the necessary facilities for the repair are not available, it is advisable to seek consultation or assistance from a suitable center where specialists are available.

Conclusions

This paper discusses various issues related to childbirth qualifications, the limitations of the current WHO perineal injury scale, surgical techniques, training, and the human factor in perineal injuries, which can lead to an increased risk of incontinence. The literature suggests that perineal injuries are irreversible and performing a primary perineal repair within 6 to even 12 hours of childbirth, including immediately after delivery or during the fourth stage of labor, ensures the best long-term outcome in terms of continence. Therefore, this should be the standard practice. However, due to the diverse settings of childbirth in different hospitals, acquiring skills for the effective management of perineal injuries and providing comprehensive post-treatment care to patients can be challenging. Proper and thorough repair of perineal injuries requires knowledge of anatomy and technical repair steps and practical application of these skills in managing actual perineal injuries during childbirth. It is not realistic to expect all doctors delivering babies with perineal damage to perform these complex repairs, even if they have undergone simulated training. For severe perineal damage and when risk factors for incontinence are present, it may be advisable to delay the repair for 8-12 hours until a specialist in perineal maintenance can be involved (Ismail, 2008). Well-performed repairs carried out 8-12 hours after childbirth can yield long-term results comparable to a well-performed primary repair. In such cases, a specialist should perform the perineal repair and supervise the patient until after hospitalization and ensure continuity of treatment.

A well-performed repair of perineal injuries after childbirth requires not just theoretical knowledge but also the application of appropriate management methods with a complete understanding of the damage mechanism and its impact on the EAS, IAS, and LAM. Given the unchanging risk factors for perineal tearing and the increasing occurrence of severe perineal injuries, sphincter repairs should be performed by specialized teams working in centers with continuity of care after hospital discharge, including directing patients to additional therapies such as nerve stimulation and physiotherapy exercises.

This approach is further supported by the increasing percentage of women giving birth at an older age and the decrease in the overall number of births, which will reduce the number of severe cases per year, further limiting the practical opportunities for managing these severe injuries in any hospital.

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