

Original Article

Sexual and bowel function in women with obstetric anal sphincter injuries after perineoplasty and sphincterorrhaphy

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Abstract

Obstetric anal sphincter injury (OASIS) may lead to persistent sexual and bowel dysfunction, even after surgical repair. Evidence on the functional outcomes after sphincterorrhaphy and perineoplasty remains limited, particularly in Indonesia. The aim of this study was to analyze the associations of perineal muscle strength and anal sphincter tone with sexual and bowel function in women with OASIS after sphincterorrhaphy and perineoplasty. This cross-sectional study was conducted at Hasan Sadikin Hospital, Bandung, Indonesia. Women with anal incontinence secondary to OASIS or fecal incontinence secondary to rectovaginal fistula who had undergone sphincterorrhaphy and perineoplasty were evaluated at three months after surgery. Vaginal tone and anal tone were assessed using perineometry and anometry, respectively. Sexual and bowel function were measured using the Female Sexual Function Index (FSFI) and Fecal Incontinence and Constipation Questionnaire (FICQ). Correlations were analyzed using Pearson's correlation test. Maternal age was significantly associated with vaginal tone, with a moderate negative correlation ($r=-0.318$; $p=0.021$). Both vaginal tone and anal tone were positively associated with sexual function, with weak but significant correlations with FSFI score ($r=0.30$; $p=0.042$ and $r=0.30$; $p=0.036$, respectively). In contrast, maternal age, fetal birth weight, vaginal tone, and anal tone were not significantly associated with bowel function as measured by FICQ score. In conclusion, among women with OASIS who underwent sphincterorrhaphy and perineoplasty, vaginal and anal tones were significantly associated with sexual function at three months after surgery, suggesting that pelvic floor recovery may contribute to better postoperative sexual function.

Keywords: Obstetrics anal sphincter injury, perineal muscle strength, anal sphincter tone, defecation function, sexual function

Introduction

Pregnancy and childbirth are natural reproductive processes experienced by most women; however, they may also contribute to pelvic floor dysfunction, particularly after vaginal delivery. Pelvic floor dysfunction encompasses a broad range of symptoms, including sexual dysfunction, fecal incontinence, urinary leakage, and pelvic organ prolapse. More than half of women who undergo vaginal delivery are estimated to experience pelvic floor-related problems, yet data on these conditions remain limited [1]. The etiology is multifactorial, with parity, vaginal delivery, and severe obstetric perineal rupture identified as major contributing factors [2].



Among childbirth-related pelvic floor injuries, obstetric anal sphincter injuries (OASIS) represent an important clinical problem because they may lead to long-term anorectal and sexual dysfunction. These injuries are more likely to occur or be poorly managed in settings with inadequate health facilities or limited provider competence [3]. Inadequate management of severe perineal rupture and prolonged labor may increase the risk of fecal incontinence and obstetric fistula [4]. OASIS is a major risk factor for fecal incontinence, although not all women with OASIS develop fecal incontinence, particularly when appropriate primary repair is performed [5]. Defects may involve the external anal sphincter, the internal anal sphincter, or both, and successful primary repair is not always achieved [6,7].

Fecal incontinence, defined as the involuntary passage of stool or mucus, and constipation, defined as infrequent bowel movements, usually fewer than three times per week and often accompanied by straining, are common gastrointestinal disorders [8]. These conditions are reported more frequently in women and older adults, respectively, with prevalence ranging from 2.2% to 11.3% for fecal incontinence and approximately 15% for constipation [9]. Although several instruments are available to assess incontinence severity, no gold standard has been established, and the most clinically useful assessment remains uncertain [10]. For this reason, patient-reported outcome measures have gained increasing importance in clinical practice to better individualize treatment evaluation.

Women with OASIS commonly report inability to control flatus, loose stool, and hard stool [11]. Sexual dysfunction has also been described, particularly discomfort during intercourse due to fear of fecal leakage from the vagina [12]. These complaints substantially impair quality of life. A previous study showed that such symptoms are closely related to OASIS, which arises as a consequence of severe perineal rupture during pregnancy and childbirth [13]. Physical trauma to the perineum may further impair sexual function through injury to the neural and vascular structures of the pelvic floor. Over time, such injury may weaken pelvic floor muscle strength and contribute to chronic urinary incontinence, anal incontinence, and sexual dysfunction [14-16].

Sphincterorrhaphy and perineoplasty are surgical procedures used to correct OASIS, but whether bowel and sexual function can return to normal after these interventions remains unclear. Perineoplasty is a perineal repair procedure involving the removal of excess skin and distal vaginal mucosa, followed by the approximation of the superficial transverse perineal and bulbocavernosus muscles [14]. Sphincterorrhaphy is commonly performed in women with moderate to severe anal incontinence through approximation of the external and internal anal sphincter muscles [15]. However, evidence regarding the success of these procedures in restoring function remains limited, particularly in Indonesia. Therefore, this study aimed to analyze the association of perineal muscle strength and anal sphincter tone with sexual and bowel function in women with OASIS after perineoplasty and sphincterorrhaphy.

Methods

Study design and setting

This cross-sectional study was conducted at the Urogynecology Outpatient Clinic, Hasan Sadikin Hospital, Bandung, Indonesia. The study involved a review of medical records and clinical assessment of patients at three months after surgery. Eligible cases were identified from procedures performed between January 2020 and December 2023.

Patients' eligibility criteria

The study population comprised postpartum women diagnosed with anal incontinence secondary to obstetric anal sphincter injury or fecal incontinence secondary to rectovaginal fistula. Patients were eligible if they had undergone sphincterorrhaphy and perineoplasty and attended follow-up assessment at three months after the procedure. Patients were excluded if they had pre-existing anal incontinence before the index pregnancy, incomplete medical records, loss to follow-up, or non-obstetric causes of anal sphincter injury.

Sampling method

A total consecutive sampling approach was used. All patients who met the eligibility criteria during the study period were included to provide a comprehensive assessment of the available clinical cases. Initially, 48 patients met the eligibility criteria. Two were excluded because of surgical failure, resulting in a final sample of 46 patients.

Data collection procedure

Data collection was conducted in two phases. First, retrospective data were obtained from electronic and paper-based medical records, including demographic characteristics, obstetric history, OASIS severity, and details of the initial surgical procedure. Second, participants underwent clinical assessment three months after surgery. This assessment included evaluation of anal sphincter tone and vaginal tone using manometric instruments, administration of the FSFI and FICQ questionnaires, and follow-up interviews to obtain patient-reported outcomes related to recovery and quality of life.

Primary data were obtained through clinical examination, perineometry, anometry, ultrasonography, and questionnaire-based assessment using the FSFI and FICQ. Secondary data from medical records were used to identify eligible patients and document their baseline characteristics.

Study variables

The main dependent variables were sexual function and bowel function, measured using the FSFI and FICQ, respectively. The main independent variables in this study were perineal muscle strength and anal sphincter tone, assessed using perineometry and anometry, respectively. In addition, demographic and clinical characteristics, including age, obstetric history, and injury severity, were obtained from medical records to describe the study population and to support the interpretation of the findings.

Female Sexual Function Index (FSFI) measurement

Female sexual function was assessed using FSFI, a multidimensional instrument that evaluates six domains: desire, arousal, lubrication, orgasm, satisfaction, and pain [17]. The desire domain is assessed in Questions 1 and 2, which evaluate the frequency and intensity of sexual desire. The arousal domain is assessed in Questions 3 to 6, which evaluate the frequency and level of sexual arousal, as well as confidence and satisfaction related to arousal. The lubrication domain is covered in Questions 7 to 10, which assess the frequency, ease, and maintenance of vaginal lubrication during sexual activity. The orgasm domain is measured in Questions 11 to 13, which assess orgasm frequency, difficulty, and satisfaction. The satisfaction domain is assessed in Questions 14 to 16, which address emotional closeness with a partner, sexual relationship satisfaction, and overall sexual life satisfaction. The pain domain is measured in Questions 17 to 19, which assess the frequency and severity of discomfort or pain during and after vaginal penetration.

Domain scores were calculated according to the standard FSFI scoring algorithm, in which each domain score is multiplied by a specific factor [17]. The total FSFI score ranges from 2.0 to 36.0, with scores <26.55 indicating female sexual dysfunction [17].

Fecal Incontinence and Constipation Questionnaire (FICQ) measurement

Bowel function was assessed using FICQ, a self-administered instrument consisting of 20 items [18]. Of these, 15 items assess bowel leakage or fecal incontinence, and 5 assess constipation-related symptoms. Each item uses a Likert-type response scale with categories such as rarely or never, occasionally, sometimes, and always [18]. Each response is assigned a numerical score, with higher scores reflecting greater symptom severity and poorer bowel function. In this study, higher scores in the bowel leakage domain indicated more severe fecal incontinence, whereas higher scores in the constipation domain indicated more severe constipation-related dysfunction [18].

Perineometry and anometry procedure

Perineometry was performed to assess vaginal pressure generated by pelvic floor muscle contraction using a vaginal probe inserted into the vaginal canal, while anometry was performed to assess anal tone generated by anal sphincter contraction using an anal probe inserted into the anal canal. Pelvic floor muscle strength was also graded using the modified Oxford scale [19]. Age was categorized as <35 years and ≥35 years because collagen production peaks at 25–34 years of age and then progressively declines, with an estimated reduction of approximately 25% over 40 years [19].

This study used the Peritron 9300V (Cardio Design, Australia), which consists of a vaginal probe measuring 108 mm in length and 26 mm in width, with an active sensing area of 55 mm. The device measures pressure in centimeters of water (cmH₂O) over a range of 0 to 300. Briefly, participants were placed in the supine gynecological position with the knees flexed and hips abducted. Before examination, they were instructed to empty their bladder. They were then taught how to isolate pelvic floor muscle contractions while avoiding the use of accessory muscles, including the abdominal, gluteal, and hip muscles. During testing, participants were asked to perform a maximal voluntary contraction while breathing normally and avoiding the Valsalva maneuver.

Pelvic floor muscle strength and contraction quality were initially evaluated by digital palpation. During this procedure, the examiner inserted the first two phalanges of the index and middle fingers into the anterior third of the vaginal canal using a gloved hand and lubricant gel. Participants were then instructed to squeeze the examiner's fingers as strongly as possible. Muscle strength was graded using the Modified Oxford Scale, a 6-point scale for classifying muscle response [20]. In this study, the Oxford scale was used to support the results of quantitative examination.

Statistical analysis

Statistical analysis was performed using IBM SPSS Statistics for Windows version 21.0 (IBM Corp., Armonk, NY, USA). Data normality was assessed using the Shapiro-Wilk test, and homogeneity of variance was evaluated using Levene's test. Correlations between perineometry and anometry measurements and FSFI and FICQ scores were analyzed using Pearson's correlation test. A $p \leq 0.05$ was considered statistically significant. All data were entered into a customized spreadsheet before analysis.

Results

Patients' characteristics

A total of 46 patients were evaluated at three months after the procedure, and their characteristics are presented in **Table 1**. Overall, only a few complications or recurrences were observed following previous obstetric anal sphincter injury repair. Two cases of recurrent rectovaginal fistula were identified, which were considered to be related to nutritional problems, poor tissue condition, inadequate personal hygiene, hard stool, and technical difficulties during surgery.

Table 1. Baseline demographic and clinical characteristics of women with OASIS after sphincterorrhaphy and perineoplasty

Variable	Mean±SD	Minimum	Maximum
Age	29.6±7.2	20	57
Perineometry (mmHg)	38.2± 2.8	32.7	43.4
Anometry (mmHg)	38.5±4	27.8	44
FSFI score	25.4±2.9	21.6	31.2
FICQ score	3.2±0.4	2.8	3.9
Fetal weight	3250±198.2	2800	3600

The mean age of the patients was 29.6±7.2 years (**Table 1**). The mean perineometry and anometry values were 38.2±2.8 mmHg and 38.5±4.0 mmHg, respectively. The mean FSFI and FICQ scores were 25.4±2.9 and 3.2±0.4, respectively. The mean fetal birth weight was

3250±198.2 g. Based on vaginal tone assessment, 30.4% (n=14) of women had a value of <33.5 mmHg, whereas the remaining 69.6% (n=32) had a vaginal tone of ≥33.5 mmHg (**Table 1**).

Before evaluating the correlations between vaginal and anal tones and sexual and bowel function, the correlations of maternal characteristics with vaginal and anal tones, as well as sexual and bowel function, were first assessed to determine whether any maternal variables were associated with vaginal tone, anal tone, sexual function, or bowel function.

Correlation between maternal characteristics and vaginal and anal tones

The correlation analysis showed that maternal age was significantly associated with vaginal tone, but not with anal tone (**Table 2**). Age had a moderate negative correlation with perineometry ($r=-0.318$; $p=0.021$), indicating that older age was associated with lower vaginal tone. In contrast, age was not significantly correlated with anometry ($r=-0.243$; $p=0.104$) (**Table 2**). Fetal birth weight was also not significantly associated with either vaginal tone or anal tone, with weak negative correlations observed for perineometry ($r=-0.095$; $p=0.531$) and anometry ($r=-0.252$; $p=0.091$) (**Table 2**). These findings indicate that, in this study population, only maternal age was significantly associated with vaginal tone at 3 months after sphincterorrhaphy and perineoplasty.

Table 2. Correlation between age and birth weight with vaginal and anal tones

Characteristics	Perineometry (vaginal note)			Anometry (anal tone)		
	Mean±SD	r	p-value	Mean±SD	r	p-value
Age	29.2±6.96	-0.318	0.021*	29.2±6.96	-0.243	0.104
Birth weight	3260±195.2	-0.095	0.531	3260±195.2	-0.252	0.091

*Statistically significant at $p<0.05$

Correlation between maternal characteristics and sexual and bowel function

The correlation analysis showed that maternal age and fetal birth weight were not significantly associated with sexual or bowel function. As presented in Table 3, age had a weak negative correlation with FSFI score ($r=-0.255$; $p=0.087$) and a very weak positive correlation with FICQ score ($r=0.062$; $p=0.682$). Fetal birth weight also showed no significant correlation with FSFI score ($r=0.150$; $p=0.320$) or FICQ score ($r=0.065$; $p=0.668$). These findings indicate that, in this study population, maternal age and fetal birth weight were not significantly associated with sexual or bowel function at three months after sphincterorrhaphy and perineoplasty.

Table 3. Correlation between age and birth weight with scores of Female Sexual Function Index (FSFI) and FICQ Fecal Incontinence and Constipation Questionnaire (FICQ)

Characteristics	FSFI score			FICQ		
	Mean±SD	r	p-value	Mean±SD	r	p-value
Age	29.2±6.96	-0.255	0.087	29.2±6.96	0.062	0.682
Birth weight	3260±195.2	0.150	0.320	3260±195.2	0.065	0.668

Correlation between vaginal and anal tones and sexual function

The correlation analysis showed that both vaginal tone and anal tone were significantly associated with sexual function as measured by the FSFI score. Perineometry showed a weak positive correlation with FSFI score ($r=0.302$; $p=0.042$), while anometry also showed a weak positive correlation with FSFI score ($r=0.309$; $p=0.036$) (**Table 4**). These findings indicate that higher vaginal and anal tones were significantly associated with better sexual function at three months after sphincterorrhaphy and perineoplasty.

Table 4. Correlation between vaginal and anal tones with Female Sexual Function Index (FSFI) score

Assessment type	FSFI score		
	Mean±SD	r	p-value
Perineometry (vaginal tone)	25.4±2.98	0.302	0.042*
Anometry (anal tone)	3.2±0.39	0.309	0.036*

*Statistically significant at $p<0.05$

Correlation between vaginal and anal tones and bowel function

The correlation analysis showed that neither vaginal tone nor anal tone was significantly associated with bowel function as measured by the FICQ score. Perineometry showed a weak negative correlation with FICQ score ($r=-0.096$; $p=0.526$), while anometry also showed a weak negative correlation ($r=-0.153$; $p=0.309$) (Table 5). These findings indicate that, in this study population, higher vaginal or anal tone was not significantly associated with better bowel function at three months after sphincterorrhaphy and perineoplasty.

Table 5. Correlation between vaginal and anal tones with Fecal Incontinence and Constipation Questionnaire (FICQ) score

Assessment type	FICQ score		
	Mean±SD	<i>r</i>	<i>p</i> -value
Perineometry (vaginal tone)	25.4±2.98	-0.096	0.526
Anometry (anal tone)	3.2±0.39	-0.153	0.309

Discussion

The aim of this study was to analyze the associations of perineal muscle strength and anal sphincter tone with sexual and bowel function in women with OASIS after sphincterorrhaphy and perineoplasty. In this study, vaginal tone was significantly associated with maternal age. Both vaginal and anal tones were significantly associated with sexual function after sphincterorrhaphy and perineoplasty in women with OASIS. Neither maternal characteristics nor pelvic floor tone measurements (muscle strength and anal sphincter tone) were significantly associated with bowel function. These findings suggest that postoperative sexual function may be more closely related to pelvic floor muscle recovery than bowel function in this population.

The significant negative correlation between age and vaginal tone indicates that older women tend to have lower vaginal tone after surgery. This finding is biologically plausible, as aging is associated with reduced tissue elasticity, declining collagen content, and diminished muscle strength, all of which may affect pelvic floor recovery after childbirth-related trauma [3,4].

In the present study, vaginal tone was assessed using perineometry, a reliable method for measuring pelvic floor muscle strength and resistance. However, although perineometry provides objective quantitative data, manometric values are still not uniformly categorized for routine clinical interpretation. The mean perineometry value in this study was 38.2 ± 2.8 mmHg, which falls within the range previously described as normal contraction intensity [10,28]. This finding suggests that, at three months after sphincterorrhaphy and perineoplasty, most participants had achieved a measurable degree of pelvic floor muscle recovery. Previous studies, however, have shown inconsistent associations between pelvic floor muscle pressure and maternal or clinical characteristics, indicating that recovery is likely influenced by multiple factors beyond obstetric history alone [19,29-31].

This study also found that both vaginal tone and anal tone were positively correlated with sexual function, as reflected by the FSFI score. Although the correlations were weak, both were statistically significant, indicating that better pelvic floor muscle tone was associated with better postoperative sexual function. This finding is consistent with the physiological role of the pelvic floor in female sexual health. The vaginal and anal sphincters are anatomically and functionally connected within the pelvic floor complex, and adequate muscle tone may contribute to vaginal support, genital sensation, arousal, and orgasmic function. Childbirth-related perineal trauma is known to impair sexual function, particularly through dyspareunia, reduced libido, and decreased sexual satisfaction [16,17,33,34]. Therefore, improvement in vaginal and anal tone after repair may reflect improved neuromuscular integrity and may contribute to better sexual outcomes.

The association between anal tone and sexual function may also reflect the broader integrity of the pelvic diaphragm. Stronger anal sphincter tone may indicate better overall pelvic floor support, which is important for comfortable sexual activity and maintenance of pelvic organ stability. In addition, stronger pelvic floor contractions may enhance local blood flow and contribute to the arousal and orgasmic phases of sexual response. However, the correlation coefficients in this study were modest, suggesting that sexual function is influenced not only by

pelvic floor tone but also by psychological, relational, and social factors that were not assessed in this study [30,34].

In contrast, bowel function was not significantly associated with maternal age, fetal birth weight, vaginal tone, or anal tone. These findings suggest that bowel symptoms after OASIS repair are multifactorial and may not be adequately explained by pelvic floor tone measurements alone. Fecal incontinence and constipation may be influenced by other factors, such as the extent of sphincter injury, pudendal nerve damage, tissue healing, stool consistency, dietary habits, hydration, physical activity, and bowel habits before pregnancy [2,4,5]. Although patients with OASIS are at substantially increased risk of fecal incontinence, not all women with OASIS develop persistent bowel symptoms after repair [21,22]. In this study, bowel function was assessed using the FICQ, which captures patient-reported symptoms and therefore provides an important clinical perspective, particularly because the severity of fecal incontinence is often best reflected by the patient's subjective experience rather than by physiological tests alone [32].

The clinical course of bowel complications after obstetric sphincter injury may also vary considerably. Rectovaginal fistula and other wound-related complications may present early or several months after delivery and repair. Previous studies have reported that wound complications are often identified within the early postpartum period, whereas fistula formation and anal fistula may occasionally be diagnosed much later [8,22,25-27]. This variation may partly explain why bowel dysfunction was not significantly correlated with tone measurements in the current study, as symptom persistence may depend on delayed healing, infection, abscess formation, or other structural problems not captured by perineometry or anometry alone.

Overall, the findings of this study emphasize the importance of proper recognition and repair of obstetric anal sphincter injuries. Adequate surgical management may help restore pelvic floor tone and improve sexual function, although recovery of bowel function appears to be more complex and may require additional evaluation beyond tone measurement alone. Persistent dysfunction after OASIS can substantially affect women's quality of life, including their sexual well-being and daily functioning.

Some limitations should be considered when interpreting these findings. Because preoperative data and repeated postoperative assessments were unavailable, the extent of functional improvement after sphincterorrhaphy and perineoplasty could not be determined. The relatively small sample size from a single tertiary center may have limited the statistical power to detect weaker associations and may reduce the generalizability of the findings to other settings. In addition, sexual and bowel function were assessed using self-reported questionnaires, which may be influenced by recall bias, response bias, and individual differences in symptom perception. Sexual function, in particular, is shaped by physical, psychological, relational, and sociocultural factors, many of which were not measured in this study. Similarly, bowel function after OASIS repair is likely influenced by a complex combination of structural, neurological, and behavioral factors that may not be adequately captured by tone measurements alone.

Conclusion

Vaginal tone was significantly associated with maternal age, while both vaginal and anal tones were significantly associated with sexual function in women with OASIS after sphincterorrhaphy and perineoplasty. In contrast, maternal characteristics, vaginal tone, and anal tone were not associated with bowel function. These findings suggest that pelvic floor and anal sphincter tone may be more relevant to postoperative sexual recovery than to bowel function in this population. Further longitudinal studies with larger sample sizes and pre- and post-operative assessments are needed to better clarify the long-term functional outcomes after OASIS repair.

Ethics approval

The study was approved by the Ethics Committee of Hasan Sadikin General Hospital, Bandung, Indonesia (No. 1350/UN6.KEP/EC/2022).

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Competing interests

All the authors declare that there are no conflicts of interest.

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Underlying data

Derived data supporting the findings of this study are available from the corresponding author on request.

Declaration of artificial intelligence use

We hereby confirm that no artificial intelligence (AI) tools or methodologies were utilized at any stage of this study, including during data collection, analysis, visualization, or manuscript preparation. All work presented in this study was conducted manually by the authors without the assistance of AI-based tools or systems.

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