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RESEARCH

The outcome of early perineal rehabilitation in obstetric anal sphincter injuries: a single-center experience

Martina Arcieri[1] · Ginevra Battello[2] · Annalisa Graziano[2] · Matteo Alfarè Lovo[2] · Stefano Restaino[1,3] · Francesco D'Antonio[4] · Alessandro Lucidi[4] · Michela Segatti[1] · Marina Comuzzi[2] · Elisa Barbui[1] · Chiara Carpenedo[5] · Emanuele Biasutti[5] · Lorenza Driul[1,2] · Giuseppe Vizzielli[1,2]

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Abstract

Purpose The objective of this study is to evaluate the impact of pelvic floor physical therapy (PFPT) on symptoms and quality of life in women who experienced third- and fourth-degree perineal tears (Obstetric Anal Sphincter Injuries, OASIS) during childbirth. OASIS can lead to anal incontinence and dyspareunia, having important implications regarding the quality of life and health of women but, unfortunately, there is no standard practice for postpartum care following OASIS.

Methods In this retrospective observational study, patients diagnosed with OASIS between January 2016 and June 2023 were enrolled. Since 2016, all women with OASIS have been routinely referred for physiatric evaluation and pelvic floor rehabilitation. Validated questionnaires (Wexner score and Marinoff scale) were administered to enrolled women to assess anal incontinence and dyspareunia.

Results The study included 148 women, of whom 88 responded to the questionnaires. Participants were divided into two groups: those who underwent PFPT ($N=68$) and those who declined it ($N=20$). The mean follow-up period was 1447.35 days. The Wexner score was lower in the PFPT group compared to the no-PFPT group ($p=0.050$). The Marinoff score did not show a statistically significant difference between the two groups ($p=0.381$).

Conclusion PFPT was shown to be effective in reducing AI symptoms in women with OASIS, improving quality of life and maintaining its effects in the long term, but without providing benefits for dyspareunia. Strengths of this study include the use of validated questionnaires, the long follow-up period, and the involvement of a specialized team of physiatrists and physiotherapists.

Keywords Obstetric anal sphincter injuries (OASIS) · Pelvic floor rehabilitation · Postpartum care · Incontinence · Women's health

What does this study add to the clinical work

This is the study with the longest follow-up to investigate the long-term effects of PFPT for OASIS; this study provides evidence for the long-term effectiveness of PFPT in managing AI symptoms in women with OASIS.

Driul Lorenza and Vizzielli Giuseppe these authors contributed equally.

✉ Stefano Restaino
s.restaino@studenti.uniss.it

1 Clinic of Obstetrics and Gynecology, "S. Maria Della Misericordia" University Hospital, Azienda Sanitaria Universitaria Friuli Centrale (ASUFC), Udine, Italy

2 Medical Area Department (DAME), University of Udine, Udine, Italy

3 PhD School in Biomedical Sciences, Gender Medicine, Child and Women Health, University of Sassari, Piazza Università 21, 07100 Sassari, Italy

4 Center for Fetal Care and High-Risk Pregnancy, University of Chieti, Chieti, Italy

5 Institute of Physical Medicine and Rehabilitation "Gervasutta", Udine, Italy

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Background

Obstetric anal sphincter injuries (OASIS) encompass both third- and fourth-degree vagino-perineal lacerations. Third-degree (III) perineal lacerations involve tearing of the perineal skin, underlying muscles, and the anal sphincter complex. Further sub-classification is used to indicate the degree of involvement of the anal sphincter—IIIA: less than 50% of the external anal sphincter (EAS) thickness is compromised; IIIB: more than 50% of the external anal sphincter (EAS) thickness is compromised; IIIC: both the internal (IAS) and external anal sphincters are involved. Fourth-degree (IV) perineal lacerations extend further to involve internal (IAS) and external anal sphincter (EAS) and the anal canal lining or rectum lining [1].

Risk factors for OASIS include a prolonged second stage of labor, episiotomy, primiparity, large for gestational age fetus, fetal posterior presentation, advanced maternal age, operative vaginal delivery, and prior OASIS [2]; some recent studies also suggest that epidural analgesia may represent an additional independent risk factor for obstetric injuries; however, the data on this subject are conflicting [3].

The clinical diagnosis of OASIS is made in approximately 5.7% of primiparous and 1.5% of pluriparous patients with no prior obstetric history of OASIS [4–8]. They are associated with significant maternal morbidity in the short and long term. Anal incontinence (AI) is the most feared sequela, with persistent fecal incontinence rates among women who have suffered sphincter tears at 9% and persistent gas incontinence rates reaching 24%. Another common consequence is dyspareunia, a disabling symptom during intercourse that results in a reduction in the quality of life for both the woman and the couple [9–11]. OASIS, therefore, has important implications regarding the quality of life and health of women and couples well beyond the period immediately after childbirth. Unfortunately, there is no standard practice for postpartum care following OASIS.

Pelvic floor physical therapy (PFPT) has been shown to improve the quality of life and symptoms in women with OASIS [12, 13]. Resuming the sphincter function is possible when early perineal rehabilitation is provided following a prompt evaluation of the perineal complex muscles. The muscle tone of the perineal body can be an effective weapon in restoring sphincter functions and improving the quality of life of these women.

Currently, there is a lack of data on the effect of PFPT in women who underwent primary perineal repair after OASIS [14–19].

This study aims to evaluate the impact of an early perineal rehabilitation path on the quality of life and symptoms reported by patients who experienced III- or IV-degree vagino-perineal lacerations during childbirth.

Methods

A retrospective observational study was conducted in patients with III- and IV-degree vagino-perineal laceration who delivered at the Obstetric and Gynecology department of the Azienda Sanitaria Universitaria Friuli Centrale, Udine in Italy.

The study obtained approval from the ethics review committee (Institutional Review Board), reference number 180/2023.

Eligible subjects included women aged 18 years or older (at the time of delivery) giving birth at our Clinic (Hospital) between 01.01.2016 and 31.06.2023 with a diagnosis of OASIS and who consented to participate in the study for the participation to the study. Inclusion criteria were vaginal delivery, vacuum-assisted vaginal delivery, at gestational age of greater than or equal to 33 completed weeks; singleton or multiple gestation vaginal deliveries; and ability to read and speak Italian language.

Patients were excluded when they could not understand Italian, when informed consent was not provided, and when they had a history of anorectal surgery before pregnancy and delivery.

Vagino-perineal lacerations were diagnosed and corrected at the time of birth, after the third stage of labor. The diagnosis of OASIS was always made by an experienced gynecologist (who has participated in at least one theoretical-practical course based on the Royal College of Obstetricians and Gynecologists guidelines for the OASIS repair and has already repaired at least ten OASIS) who consulted with another experienced gynecologist or proctologist. The suturing of third-degree A and III B lacerations were always performed by a senior gynecologist with experience in repairing OASIS. For III C and IV-degree lacerations, the repair was always performed either by a senior gynecologist or by a proctologist based on the expertise.

According to our internal protocol, in case of IV-degree lacerations, the gynecologist must also have extensive experience in pelvic surgery and must consult with a multidisciplinary team including an experienced proctologist.

The suturing (overlap or end-to-end repair) was performed following the latest guidelines and scientific evidence on the topic [20]. In fact, the anorectal mucosa is sutured with interrupted or continuous 3–0 delayed absorbable sutures and the internal anal sphincter with end-to-end technique with interrupted sutures using 3–0 delayed absorbable suture. The full-thickness laceration of the EAS was repaired by end-to-end or overlapping technique; for partial-thickness tears, an end-to-end technique was performed. For IIIC- and IV-degree tears, an overlap technique was performed. Monofilament sutures are used to repair both the IAS and EAS. All interventions were

performed under peridural or general anesthesia. Local anesthesia was added when suitable [21]. Intraoperative antibiotics were administered. All patients with OASIS were scheduled for a postpartum urogynecological and proctological evaluation with endoanal ultrasound and manometry, when necessary.

Since 2016, all mothers with OASIS routinely underwent a physiatrist examination at our clinic. During the first visit, the function of the EAS external anal sphincter or both EAS and IAS at rest and during voluntary contraction was examined, focusing on the patient's intuitive awareness and knowledge of the pelvic floor. During the exploration phase, the presence of anal bleeding, mucosal prolapse, sores, fistulas and the extent of perineal excursion were assessed, while with the digital rectal exploration, pain, anatomical changes and the external anal sphincter and pubo-rectal muscle were evaluated. The pelvic floor muscles' assessment evaluates strength, endurance, and exhaustion, assessing the presence or absence of muscle synergy (i.e., the ability to isolate the contraction of the perineal muscles, without using other muscles) and the presence or absence of reverse command [22]. Moreover, the neurological reflexes of the S4-S4 area (ano-cutaneous reflex) and S2-S4 (bulbo-cavernous reflex) were evaluated. Subsequently, the women started the rehabilitation program with a dedicated physiotherapist. The rehab consisted of an initial phase of education on anatomy, physiology, and anal function, followed by a pelvic floor exercise program. In this phase, the woman was trained in correct respiratory synergy, pelvic postural antiversion-retroversion, elimination of synergies and selective strengthening of the pelvic musculature in the case of IA or restoration of colorectal-anal coordination in the case of dyschezia, pain in defecation. The treatment comprised 1 or 2 weekly appointments for a total of 20 treatments combined with daily self-treatment (approx. 10 min per day). The woman learned a process of re-education and re-functioning of the pelvic floor through behavioral therapy and physiokinesitherapy alone or combined with functional electrical stimulation or biofeedback stimulation if muscle strength was considered weak (0 or 1 on a clinical muscle strength scale 0–3 [23]) during the first physiatrist examination.

All participants gave written consent to use their data for research purposes and data were pooled from the clinical software in our institution. The study complied with the ethical principles of the Declaration of Helsinki and Good Clinical Practice Patients.

The participants filled two validated questionnaires that investigated rectal function and the presence of dyspareunia; the questionnaires were created using Microsoft Forms and sent by email together with the consent (Supplementary File 1). The validated questionnaires used for the collection of data relating to the symptoms were the following: Marinoff dyspareunia scale [24] and Wexner Score-Fecal Incontinence [25]. A Wexner score ≥ 2 identifies women with anal incontinence after OASIS that affects quality of life [26].

The following information was gathered: maternal, delivery, postpartum and neonatal data, and data on pelvic floor rehabilitation. Following anonymization and assignment of unique identifiers, the collected data were analyzed using statistical methods. Follow-up was defined as the time between vaginal delivery and questionnaires compilation.

Statistical analysis

Data were analyzed using an anonymized database (Microsoft Excel—Version 2410 Build 16.0.18129.20100). The sample population was described in its clinical and demographic characteristics using descriptive statistics techniques. Quantitative variables were presented as mean, standard deviation, min and max, standard deviation, and median. Qualitative variables were summarized as frequencies and percentages. Comparisons between groups were made using the $\chi 2$ test for nominal variables and the Student's *t* test (when normally distributed) or the Wilcoxon test (when non-normally distributed). Probability (p) values were considered statistically significant if the value was < 0.05.

Results

Between 01.01.2016 and 31.06.2023, 8319 vaginal deliveries were recorded in our hospital, of which 148 (1.8%) resulted in vagino-perineal lacerations of third or fourth degree (Fig. 1).

Clinical characteristics of women with OASIS are summarized in Table 1.

Operative delivery with Kiwi® Complete Vacuum Delivery System was required in 51 (34.5%) cases while episiotomy was performed in 52 (35.1%) cases. We recorded three cases of shoulder dystocia. Forty (27%) women had previous deliveries: fourteen a previous cesarean section, twenty-four a previous vaginal delivery and two previous vaginal births. In multiparous women, two patients had a previous third-degree laceration (Table 2).

The OASIS were classified as follows: 115 (77.7%) IIIA, 18 (12.2%) IIIB, 3 (2%) IIIC and 12 (8.1%) IV degree.

Among all patients, 37 (25%) agreed to perform postpartum urogynecological evaluation; 65 (43.9%) to undergo proctological examination and 117 (79.1%) to physiatrist evaluation. The mean time between delivery and the physiatrist visit was 44.5 days.

Of the 148 patients eligible for enrollment, 88 (59.5%) answered the questionnaire administered; the remaining patients were excluded due to exclusion criteria or refusal to participate in the study (Fig. 1). The mean follow-up (from delivery to compilation of questionnaire)

Fig. 1 Study participants

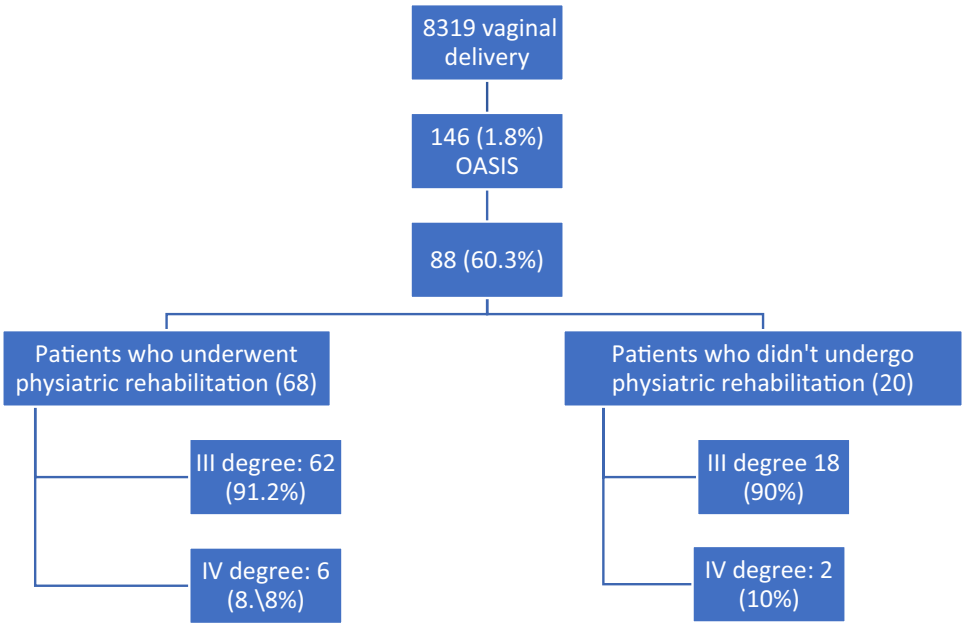

Table 1 Clinical characteristics

	N (148) (±SD or %)
BMI (kg/m^2) (mean) before pregnancy	22.5 (±1.28)
Weight (kg) (mean) at delivery	73.9 (±0.71)
Weight gain in pregnancy (kg) (mean)	12.9 (±3.53)
Week of gestation at birth (mean)	39 (±1.4)
Duration of I stage of labour (mean) (minute)	174 (±144.03)
Duration of II stage of labour (mean) (minute)	94.4 (±62.87)
Weight of babies at birth (mean) (g)	3504.5 (±366.66)
Babies' head circumference (mean) (cm)	34.8 (±11.7)
Previous vaginal delivery	28 (18.9%)*
Previous cesarean section	14 (9.4%)
Induction of labor	68 (45.9%)
Operative delivery	51 (34.5%)
Shoulder dystocia	3 (2%)
Epidural anesthesia	81 (54.7%)
Episiotomy performed	52 (35.1%)

BMI body mass index, *SD* standard deviation

*Two women had two previous vaginal births

Table 2 Type of lacerations in women with previous vaginal delivery

	N (28) (%)
No lacerations	0
First-degree	0
Second-degree	8 (28.6)
Third degree	2 (7.1)
Episiotomy	4 (14.3)
Episiotomy + I or II degree	5 (17.9)
Not known	9 (32.1)

was 1447.35 days (approximately 47 months; range 325–2958 days). Among the 88 patients, 19 patients had a subsequent vaginal delivery (none of these had an OASIS again), while 18 patients had a subsequent cesarean section, of which 16 were elective caesarian sections.

We reported the data from the questionnaires. Before the OASIS, no patient experienced fecal incontinence; 3 women (3.3%) suffered from flatus incontinence, and 15 patients (16.7%) reported dyspareunia. Among the patients with flatus, one had a previous OASIS (IIIA), while the other two had a prior vaginal delivery in another hospital, and the type of laceration was unknown.

Of the 88 patients interviewed, 20 (23%) had chosen not to have pelvic floor rehabilitation (no PFPT group) (Fig. 1). Among patients undergoing pelvic floor rehabilitation (PFPT group), 48 patients (53%) continued the exercises independently at home after finishing their sessions with the physiotherapist.

The PFPT group was compared to the no-PFPT group. There was no significant difference between the number of fourth-degree lacerations in the two groups ($p = 0.872$) and between the age at delivery (median age 32.6 vs 32.2, $p = 0.768$). The mean follow-up of the PFPT group was 1426.66 days (about 4 years; SD = 742.13 days), while that of the no PFPT group was 1795.05 days (about 5 years; SD = 684.61 days), $p = 0.050$.

The results of Wexner Score-Fecal Incontinence questionnaire are summarized in Table 3a/b.

Eighteen women (26.5%) in the PFPT group and five women (25%) had a Wexner score = 0 ($p = 0.895$). Half of the women ($N = 34$) in the PFPT group and 65% ($N = 13$)

Table 3 Data of Wexner scores for all participants

Symptoms	Never, *N* (%)		Rarely *N* (%)		Sometimes, *N* (%)		Often, *N* (%)		Always, *N* (%)	
	No PFPT (*N* = 20)	Yes PFT (*N* = 68)	No PFPT (*N* = 20)	Yes PFT (*N* = 68)	No PFPT (*N* = 20)	Yes PFT (*N* = 68)	No PFPT (*N* = 20)	Yes PFT (*N* = 68)	No PFPT (*N* = 20)	Yes PFT (*N* = 68)
Solid stool	10 (50)	52 (76.5)	2 (10)	8 (11.8)	5 (25)	4 (5.9)	2 (10)	3 (4.4)	1 (5)	1 (1.5)
Liquid stool	9 (45)	49 (72.1)	7 (35)	15 (22.1)	2 (10)	2 (2.9)	1 (5)	2 (2.9)	0	0
Flatus incontinence	5 (25)	23 (33.8%)	6 (30)	21 (30.9)	3 (15)	10 (14.7)	4 (20)	12 (17.6)	2 (1)	2 (2.9)
Use of pads	20 (100)	67 (98.5)	0	1 (1.5)	0	0	0	0	0	0
Lifestyle changes	17 (85)	61 (89.7)	2 (10)	1 (1.5)	0	4 (5.9%)	1 (5)	1 (1.5)	0	1 (1.5)

Wexner score, mean (minimum/maximum)	No PFPT (*N* = 20)	Yes PFPT (*N* = 68)	*p*-value
Solid stool	1.10 (0/4)	0.43 (0/4)	**0.010**
Liquid stool	0.74 (0/3)	0.37 (0/3)	0.051
Flatus incontinence	1.35 (0/4)	1.25 (0/4)	0.265
Use of pads	0	0.01 (0/1)	0.590
Lifestyle changes	0.25 (0/4)	0.24 (0/4)	0.938
Total score	3.65 (0/12)	2.25 (0/11)	**0.050**

Rarely = < 1 a month; Sometimes = < 1 a week but > 1 a month; Often = < 1 a day but > 1 a week; Always = > 1 a day; PFPT = Pelvic floor physical therapy

in the no-PFPT group reported a Wexner score ≥ 2 ($p = 0.237$) (Fig. 2).

We also indagated the presence of pain during penetration attempts or during complete vaginal penetration during sexual intercourse using the Marinoff dyspareunia scale; the answers are summarized in Table 4.

Discussion

Obstetric III- and IV-degree perineal lacerations are associated with significant maternal morbidity and predispose to the development of anorectal symptoms. AI, either transient or permanent, occurs in 30–50% of women who experience OASIS during their lifetime [27], affecting their well-being and quality of life.

Principal findings

- Prompt PFPT is effective in reducing the incidence of AI in women with OASIS.
- The benefits of PFPT are sustained over a long follow-up period.
- A multidisciplinary approach is essential for optimal management of OASIS and its sequelae.

Results

This retrospective observational study demonstrated the positive impact of prompt PFPT on the IA in patients who experienced III- or IV-degree vagino-perineal lacerations during childbirth.

OASIS is treated in our department by a multidisciplinary team specialized in pelvic floor dysfunctions, consisting of experienced gynecologists, proctologists, physiatrists, and

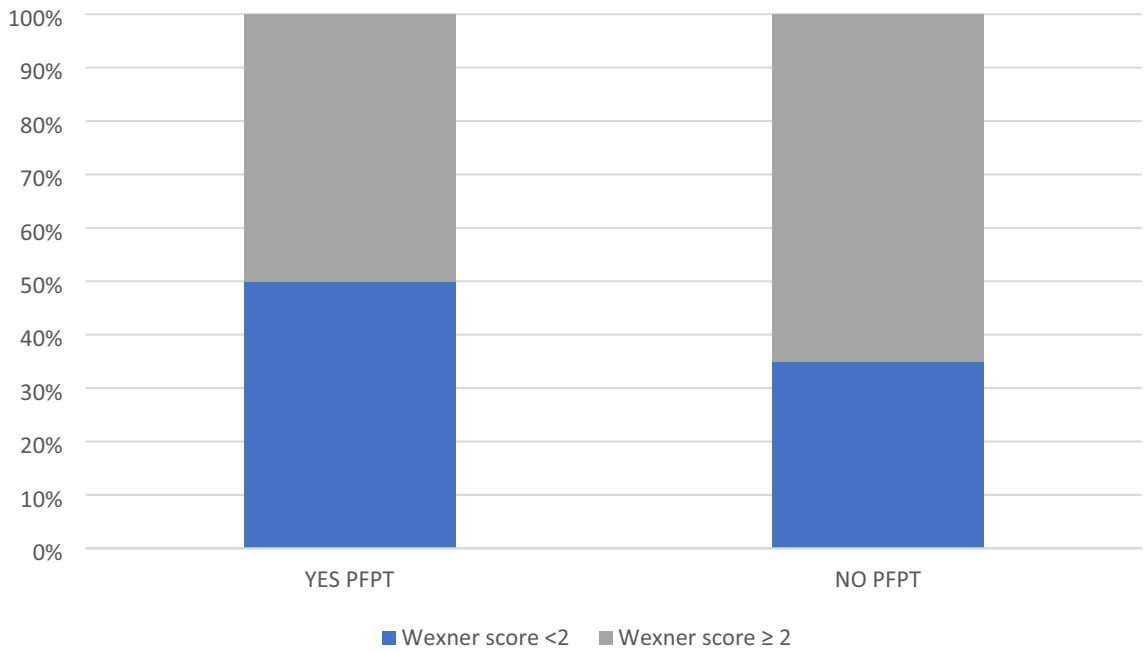

Fig. 2 Wexner score related to quality of life

Table 4 Marinoff dyspareunia scale

Symptoms	No PFPT ($N = 20$)	Yes PFT ($N = 68$)	p value
No pain, N (%)	13 (65)	36 (52.9)	0.340
Mild pain, N (%)	6 (30)	28 (41.2)	0.367
Pain that reduces the frequency of sexual intercourse, N (%)	1 (5)	3 (4.4)	0.912
Penetration not possible, N (%)	0	1 (1.5)	0.513
Total score (mean)	0.54	0.40	0.381

physiotherapists. The latter are dedicated perineal floor care professionals with extensive experience in PFPT.

Our study is the first to evaluate the effect of PFPT on AI and dyspareunia in women with previous OASIS with a long follow-up. Our follow-up is one of the longest described in the medical literature on OASIS sequelae after PFPT; the study published until now with the longest follow-up had stopped at a mean follow-up of 24 months [28]. Our results confirm the utility of PFPT in diminishing the incidence of AI. All items of the Wexner score were better in the PFPT group, whereas no difference was recorded in the score of the Marinoff dyspareunia scale. Our results on dyspareunia after OASIS are consistent with previous studies indicating that postpartum pelvic floor rehabilitation is not associated with a decrease in the prevalence of dyspareunia at mid-term follow-up [29, 30]. In our series, the number of women with pain that reduces the frequency of intercourse or makes penetration impossible is very low, so this may have influenced our results. Prospective studies with a large case series are needed to confirm these results.

As well known, AI has a negative impact on an individual's quality of life. Jangö et al. showed that a Wexner score ≥ 2 identifies women with anal incontinence after OASIS that affects quality of life [26]. In our study, there were no statistically significant differences between the PFPT and the no-PFPT groups concerning the rate of women with a Wexner score ≥ 2. However, in the no-PFPT group, there were slightly more patients with a score ≥ 2, showing a worse trend for this group. Only about 1/3 of patients in both groups had a Wexner score $= 0$ and consequently no symptoms. These data are consistent with those reported in the literature [31–33] and confirm the crucial sequelae after OASIS.

Few studies reported the outcomes of PFPT after OASIS. Oakley et al. conducted a randomized clinical trial (RCT) to evaluate the role of PFPT in a small sample (27 in intervention arm vs 23 in control arm) of women with OASIS. Patients were evaluated at baseline and 12 weeks after the delivery. The authors recorded improved subjective quality-of-life measures regardless of randomization to treatment with PFPT [34]. Von Bergen et al. conducted an RCT with a similar design to the previous one, but with different results: the authors found a significant improvement in pelvic floor symptoms and short-term quality of life in the PFPT group [35]. Several studies have shown that the short-term benefits of surgical repair of OASIS outweigh the long-term results: 80% of women were asymptomatic after repair [36], but this success is reduced to almost 50% at 5 years [37, 38]. For this reason, a long follow-up is essential to evaluate the role of PFPT.

In our study, the mean Wexner score in the no-PFPT group was higher than what reported by Baud et al., that reported a mean Wexner score = 2.3 in women with OASIS, without mentioned any physiatrist evaluation or PFPT [33].

Our rate of OASIS following vaginal delivery was 1.8% while the rate reported in literature was of 1–18% [31].

Population studies have shown a lack of knowledge of pelvic floor disorders among women [39–43]. Our study confirmed these data: only 25% of women with OASIS accepted to perform the postpartum urogynecological examination, about 44% the proctological examination and about 79% the physiatrist examination.

Clinical implications

The results of this study suggest that prompt PFPT should be considered as a valuable treatment option for women who have experienced OASIS. A multidisciplinary approach involving gynecologists, proctologists, physiatrists, and physiotherapists is essential for optimal management. However, further research is needed to confirm the long-term benefits of PFPT and to explore its effectiveness in different populations.

Research implications

While this study provides valuable information, several unanswered questions remain. Future research could focus on:

- The optimal timing and duration of PFPT for women with OASIS.
- The effectiveness of PFPT in different populations, such as women with comorbidities or those who have undergone previous pelvic floor surgery.
- The long-term outcomes of PFPT, including its impact on sexual function.

Strengths and limitations

The strengths of our study were the use of validated and detailed questionnaires to explore sexual function and AI in the study and in the control group, the long follow-up, and the team of physiatrists and physiotherapists dedicated to pelvic floor rehabilitation. Our data confirm the importance of multidisciplinary approach which allows better diagnosis and treatment of obstetric severe perineal lacerations.

Our study's limitations included the retrospective design, the lack of data on pelvic floor evaluation before and after PFPT, and the small number of women in the control group.

An RCT evaluating PFPT in women with OASIS for extended periods is starting at our Institution. This will allow analyses of how AI, related symptoms, and the related quality of life change over time.

Conclusion

In conclusion, this study provides evidence for the effectiveness of PFPT in reducing anal incontinence in women with OASIS. However, further research is needed to confirm these findings and to explore the long-term benefits of PFPT. A multidisciplinary approach involving gynecologists, proctologists, physiatrists, and physiotherapists is essential for optimal management.

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Author contributions M. A: Protocol/project development, Manuscript editing G. B.: Protocol/project development, Manuscript writing A Graziano: Protocol/project development, Manuscript writin M. A. L.: protocol/project development, Manuscript writing S.R.: data collection or management F. D'A.: data analysis A. L.: data analysis M. S.: data collection or management M. C.: manuscript editing E. B.: Manuscript editing C. Carpenedo: data collection E. Biasutti: data analysis L.Driul: manuscript writing/editing G.Vizzielli Manuscript writing/editing.

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Data availability The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Conflict of interest The authors declare no competing interests.

Ethical approval and consent to participate The study obtained approval from the ethics review committee (Institutional Review Board) on 15/09/2024 (reference number 180/2023) and was performed in accordance with the ethical standard as laid down in the Declaration of Helsinki. The data were anonymized and a written informed consent was obtained from all the patients.

Consent for publication All authors have provided consent for publication.

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