DOI: 10.34057/PPj.2022.41.03.2022-8-2
Pelviperineology 2022;41(3):159-166

Correlation between urinary incontinence and subclinical diseases of the pelvis: What is neglected in the physical examination?

Daniela BUSATO[1], Dunia VERONA[1], Claudia Veloso MUELLER[1], Cíntia Elisabete Fischer BLOSFELD[1], Maura Regina SELEME[2], Rogerio de FRAGA[1]

[1]Federal University of Parana: Universidade Federal do Parana, Parana, Brazil
[2]Inspirar Faculty Physiotherapy/Specialization for Pelvic Faculdade Inspirar, Parana, Brazil

Citation: Busato D, Verona D, Mueller CV, Blosfeld CEF, Seleme MR, de Fraga R. Correlation between urinary incontinence and subclinical diseases of the pelvis: What is neglected in the physical examination?. Pelviperineology 2022;41(3):159-166

ABSTRACT

Objectives: To evaluate and compare the presence of underlying and subclinical diseases of the pelvis through a functional preoperative physical examination in patients undergoing urinary incontinence correction and presentation of a video with the hypertonic pelvic floor and chronic pelvic pain examination.

Materials and Methods: Fifty-eight women presenting urinary incontinence were evaluated for superficial and deep pain using the visual analog scale and divided in 2 groups: With and without hypertonic pelvic floor, through electromyography.

Results: The prevalence of hypertonic pelvic floor in incontinent women in our study was 17.2%. Women with hypertonic pelvic floor had an odds ratio 5.37x higher of referring pain (p=0.02) and 5.6x higher of referring deep pain (p=0.01) during physical examination. Patients with hypertonic pelvic floor were also significantly younger (p=0.02), with a median age of 8,5 years less (40.5 years) than patients without hypertonic pelvic floor (49 years). Women who underwent cesarean sections had a risk 5x lower of displaying hypertonic pelvic floor (p=0.03).

Conclusion: Hypertonic pelvic floor and chronic pelvic pain can be identified in patients with urinary incontinence through standardized physical examination and treated preoperatively, minimizing the probability of being attributed to a complication of pelvic surgery.

Keywords: Pelvic floor evaluation; pelvic pain; physical examination; urinary incontinence; urinary incontinence surgery

INTRODUCTION

In the past couple of years, some complications have been observed after the surgical correction of stress urinary incontinence (SUI) involving meshes (Figure 1).[1]

Recent data have suggested that, in the follow-up period of eight years, 2.7% of all retropubic slings and 1.9% of the transobturator slings were removed due to chronic pelvic pain (CPP).[1]

Address for Correspondence: Daniela Busato, Federal University of Parana: Universidade Federal do Parana, Parana, Brazil
E-mail: daniela75.busato@gmail.com **ORCID ID:** orcid.org/0000-0001-7593-0462
Received: 06 September 2022 **Accepted:** 23 October 2022

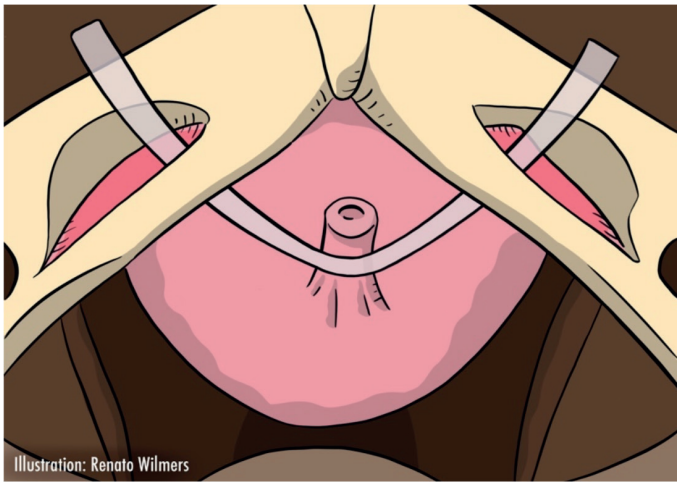

Figure 1. Transobturator sling (illustration)

Since 2011, the Food and Drug Administration (FDA)[2] has been studying the safety and efficiency concerning the use of surgical meshes in the treatment of SUI and pelvic organ prolapse (POP). Through the publication of recent research and data analysis, the FDA has been able to inform patients and doctors about SUI, surgical techniques and possible complications of the postoperative period involving meshes.[2] The Agency has also recommended that the use of surgical meshes in the SUI procedure remain labeled as Class II, which stands for low and moderate risk devices, as well as proposed studies conducted by synthetic sling manufacturers addressing post commercialization safety and efficiency. Physicians and patients are alert and waiting for the final review, foreseen to be published by the end of 2022.[2]

CPP is defined as persistent and non-cyclic pain perceived to be in structures related to the pelvis and lasting more than six months.[3] Once trigger points feedback is created, pain can become self-sustained, even after the visceral origin of the referred pain has been resolved.[4]

Our research was based on the evaluation of patients who actively sought treatment for urinary incontinence (UI), but were diagnosed during their assessment with subclinical diseases, such as CPP and hypertonic pelvic floor (HPF). These conditions could be associated with pain prior to the surgical procedure, rather than a complication of surgery.

Active search for HPF is not routine during medical physical examination; thus, it is underdiagnosed.[5] HPF is described by the same authors, in 2018, as being a primary issue or an adaptation of an acute or chronic injury, reaching one or more components of the pelvic floor skeletal muscle structures, culminating in this type of myofascial pain (Figure 2).[5]

The objective of this research is to evaluate and compare the presence of underlying and subclinical diseases of the pelvis through a functional preoperative physical examination in patients undergoing UI correction and presentation of a video with the HPF and CPP examination.

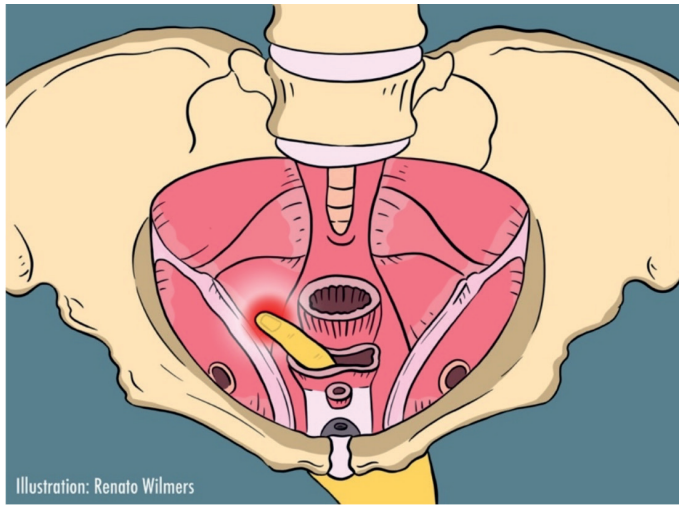

Figure 2. Trigger point on physical examination (illustration)

MATERIALS AND METHODS

The scope of this observational and cross-sectional study involved 58 women (18-59 years old) who presented with UI, from university hospitals and private medical offices. Patients were previously informed about the objective of the study, agreed to participate, and signed a free and clarified consent form. The research project was approved by the Research Ethics Committee of Faculdade Inspirar (opinion number: 1,833,987); and was approved by the Co-participant Institution, HC-UFPR-Hospital de Clínicas of Federal University of Paraná (opinion number: 2,520,073).

Standardized physical examination was conducted, where they were evaluated for superficial and deep pain using the visual analog scale (VAS), scoring points from 0 to 10, and for any other pelvic anomalies, such as pop or the presence of trigger points. They were also subjected to an electromyography of the pelvic floor, which divided them into two groups: Those who had evidence of HPF and those who did not.

The exclusion criteria were as follows: Pregnant women, women during the first six months post birth or pelvic surgery, women presenting with an organ prolapse equal to or greater than stage III from the POP-quantification (POP-Q),[6] women with urinary infection or intrapelvic masses, and women who used an intrauterine device or pacemaker.

The functionality of the pelvic floor muscles (PFM) was analysed through the Clinical Practice Guide of the Brazilian Association of Pelvic Physiotherapy, which was translated by the Royal Dutch Society for Physical Therapy and updated.[7,8] It consisted of

static and dynamic inspection, digital palpation, and functional evaluation.

Pain mapping was performed with patients in the lithotomy position and with an empty bladder. Superficial and deep pain evaluation was conducted through digital palpation of the vaginal wall using the examiner's index finger. It initiated on the external third of the vagina at 6 o'clock following clockwork orientation until it reached the internal wall of the vagina, seeking deep pain in bundles of the puborectalis muscle and left and right sides of the obturator internus muscle (Figure 3).

Pain was evaluated using the VAS, which is one of the most studied and validated methods for chronic pain.[9]

Chronic urogenital pain (CUP) was mapped and evaluated using an integrated mapping and assessment protocol, designed to systematically localize the origins of pain in CUP syndromes, allowing the patient to understand the pain and the physician to decide whether an intervention is the best option.[10]

Pelvic muscle function was evaluated through rest and maximum voluntary contraction electromyography, and the level of relaxation was measured after peak contraction. HPF was diagnosed when, during rest periods, the activity of the PFM was higher than 20% of the maximum voluntary contraction (Figure 4).

Statistical Analysis

Data were analyzed with the R software for statistical computing, and a *p*-value of <0.05 was considered statistically significant. Descriptive representations and tests were chosen to respect the non-normality of the variables and to maintain consistency. The odds ratio was estimated using the conditional maximum likelihood method.

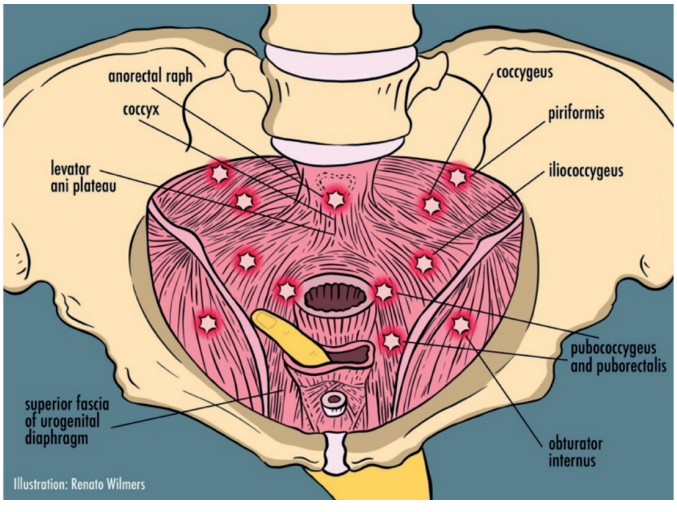

Figure 3. Pelvic pain mapping (illustration)

RESULTS

Descriptive Analysis

The proportion was the parameter chosen for the qualitative variables and the mean and interquartile range (first and third quartiles) were the parameters selected for the quantitative variables. The prevalence of HPF in women presenting with UI in our study was 17.2% (Table 1).

Group Comparison

Comparisons were made between patients with and without HPF in relation to the other variables studied. Data were analyzed using the Fischer and Mann-Whitney U tests for qualitative and quantitative measures, respectively. Statistical significance was set at $p<0.05$ (Table 2).

Women with an electromyographic diagnosis of HPF had an odds ratio 5.37 times higher (437%) of referring pain ($p=0.02$) and 5.6 higher (460%) of referring deep pain ($p=0.01$) during physical examination (Table 2).

Women with an electromyographic diagnosis of HPF had an odds ratio 5.37 times higher (437%) of referring pain ($p=0.02$), as shown in Figure 5; and 5.6 higher (460%) of referring deep pain ($p=0.01$), as shown in Figure 6, during physical examination.

Patients with HPF were also significantly younger ($p=0.02$), with a median age of 8.5 years less (40.5 years) than patients without HPF (49 years) is shown in Figure 7.

Women who underwent cesarean sections had a five times lower risk of HPF ($p=0.03$), as shown in Figure 8.

DISCUSSION

In the evaluation of the groups studied, part of the patients with UI presented with HPF and, amongst them, some also

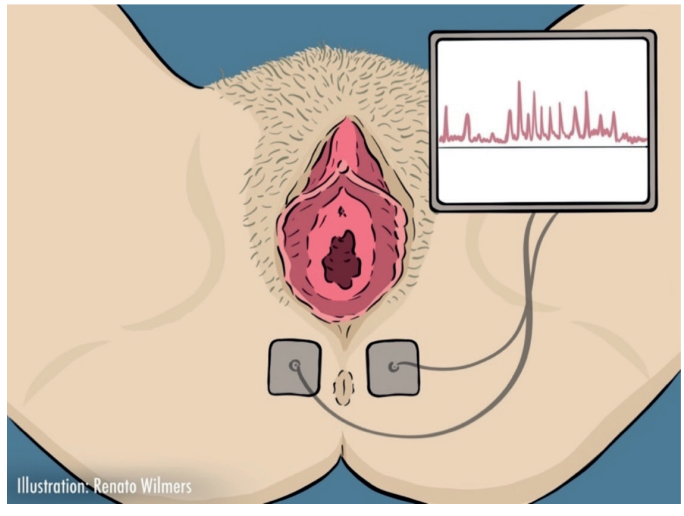

Figure 4. Electromyography during physical assessment (illustration)

Table 1. Baseline demographic and clinical characteristics			
Variable		**Number of volunteers**	**Proportion/median (Q1; Q3)**
Superficial pain	Yes	18	31.0%
	No	40	69.0%
Deep pain	Yes	15	25.9%
	No	43	74.1%
Presence of pain		20	34.5%
Hipertonic pelvic pain		10	17.2%
Age		55	47 (41; 52.5)
Type of UI	SUI	26	44.8%
	MUI	31	53.4%
BMI		55	26.75 (24.65; 30.02)
UTI (last year)		23	39.7%
Vaginal delivery		33	56.9%
Cesarean delivery		29	50.0%
Abortions		13	22.4%
Alcoholism		21	36.2%
Sedentarism		28	48.3%
Smoking		4	6.9%
Marital status	Married	38	65.5%
	Separated	9	15.5%
	Single	6	10.3%
	Widowed	2	3.4%
Ethnicity	Caucasoid	45	77.6%
	Mongoloid	3	5.2%
	Negroids	2	3.4%
Schooling	1 to 5 years	4	6.9%
	6 to 10 years	19	32.8%
	>10 years	33	56.9%
Income	<2	20	34.5%
	3 to 4	11	19.0%
	5 to 6	15	25.9%
	>6	7	12.1%

Q1; Q3: first and third quartiles; IU: incontinence urinary; SUI: stress urinary incontinence; MUI: mixed urinary incontinence; BMI: body mass index

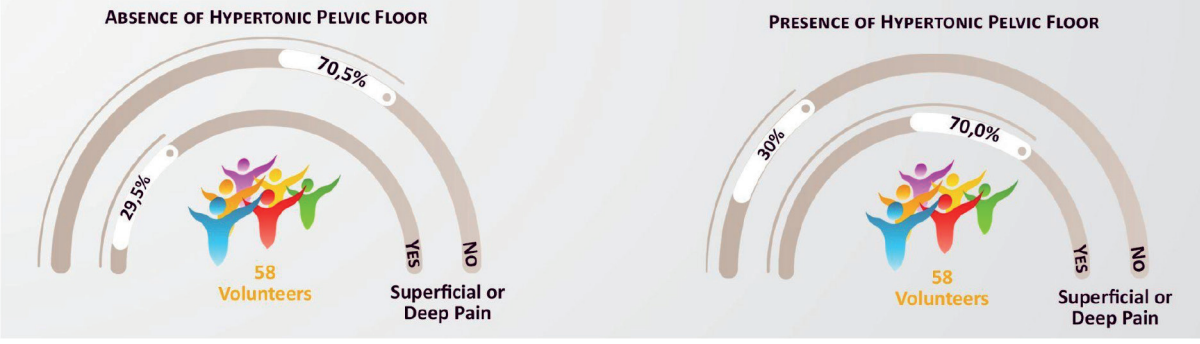

Figure 5. Comparison between groups: Presence of superficial or deep pain in patients with and without HPF (p=0.02)

HPF: hypertonic pelvic floor

Table 2. Group comparison-outcomes

Variable		Number of volunteers	Presence of hypertonic pelvic floor (n=10)	Absence of hypertonic pelvic floor (n=44)	p	OR (CI 95%)
Vaginal delivery		29	7 (70%)	22 (50%)	0.31	2.19 (0.43; 14.91)
Cesarean delivery		27	2 (20%)	25 (56.8%)	**0.03***	0.18 (0.02; 1)
Abortions		13	4 (40%)	9 (20.5%)	0.23	2.47 (0.42; 13.31)
Superficial pain		18	6 (60%)	12 (27.3%)	0.06	3.88 (0.77; 22.26)
Deep pain		15	6 (60%)	9 (20.5%)	**0.01***	5.6 (1.07; 33.39)
Presence of pain		20	7 (70%)	13 (29.5%)	**0.02***	5.37 (1.03; 37.24)
Age		51	40.5 (34.5; 46.75)	49 (41; 54)	**0.02***	
Type of IU	SUI	25	5 (50%)	20 (45.5%)	1	
	MUI	28	5 (50%)	23 (52.3%)		
BMI		51	26.95 (24.28; 28.87)	26.73 (24.61; 30.04)	0.85	
Marital status	Married	36	8 (80%)	28 (63.6%)	0.43	
	Separated	7	0	7 (15.9%)		
	Single	6	1 (10%)	5 (11.4%)		
	Widowed	2	1 (10%)	1 (2.3%)		
Ethnicity	Caucasoid	43	9 (90%)	34 (77.3%)	1	
	Mongoloid	2	0	2 (4.5%)		
	Negroids	1	0	1 (2.3%)		
Schooling	1 to 5 years	3	1 (10%)	2 (4.5%)	0.72	
	6 to 10 years	19	3 (30%)	16 (36.4%)		
	>10 anos	30	6 (60%)	24 (54.5%)		
Income	<2	18	4 (40%)	14 (31.8%)	1	
	3 to 4	11	2 (20%)	9 (20.5%)		
	5 to 6	14	3 (30%)	11 (25%)		
	>6	6	1 (10%)	5 (11.4%)		
Urinary infection (last year)		22	4 (40%)	18 (40.9%)	1	0.98 (0.17; 5.32)
Smoking		4	0	4 (9.1%)	1	0 (0; 6.81)
Alcoholism		21	4 (40%)	17 (38.6%)	1	0.94 (0.17; 4.71)
Sedentarism		26	6 (60%)	20 (45.5%)	0.5	1.71 (0.35; 9.47)

*p-value<0,05; IU: Incontinence urinary; SUI: stress urinary incontinence; MUI: mixed urinary incontinence; BMI: body mass index

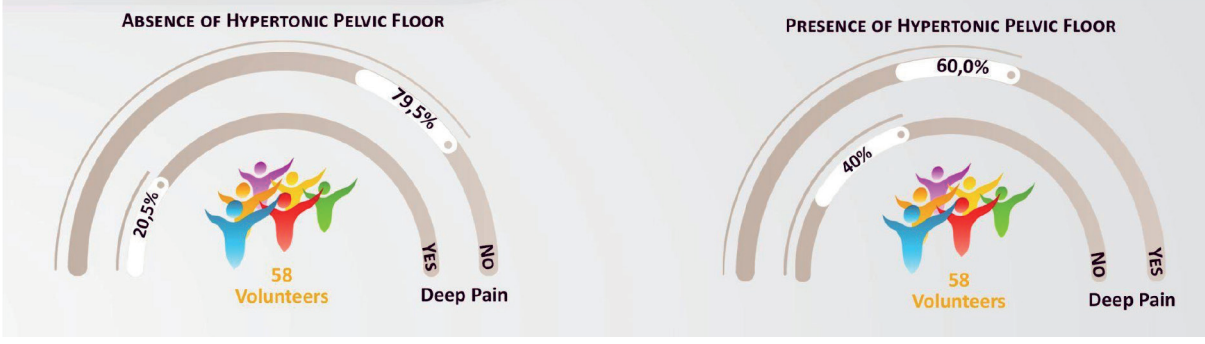

Figure 6. Comparison between groups: Presence of deep pain in patients with and without HPF (p=0.01)

HPF: hypertonic pelvic floor

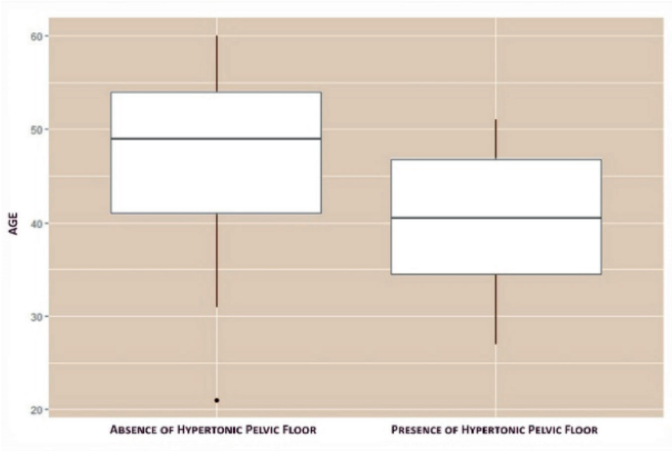

Figure 7. Patients with/without HPF-median age
HPF: hypertonic pelvic floor

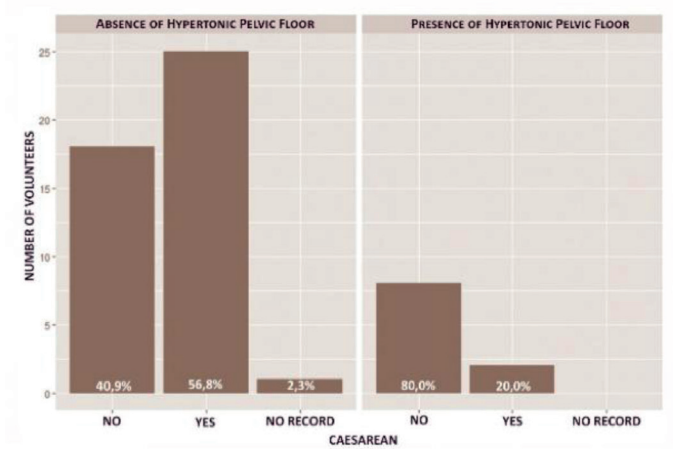

Figure 8. Comparison with/without HPF and cesarean sections
HPF: hypertonic pelvic floor

demonstrated pelvic pain, notably deep pelvic pain, in example, in the obturator internus muscle. As reported by Duckett et al.[1], patients with CPP submitted to the surgical correction of UI with synthetic mesh had a higher risk of developing persistent post-operative pain as a complication of the procedure.

It has been observed that when the PFM possess optimal tone and strength, pelvic organs are sustained with limited tension in the pelvic ligaments and fascia.[11,12] These PFM can become elongated during vaginal birth, weakened by aging or hypertonic with high stress levels, which eventually leads to pelvic floor dysfunctions.[13]

In our study, patients who had vaginal delivery had a 2.19x higher risk of presenting HPF in comparison to patients that had no vaginal delivery, even though these results were not statistically significant. All patients in our study had UI symptom, and the prevalence of HPF in our sample was 17.2%. Our data corroborate previous numbers described by Wallace et al.[13], in which a prevalence of 16% of HPF was observed in women with urinary incontinence, and it could be related to myofascial pain, dyspareunia, vulvodynia and vaginism.

As has been described by Meister et al.,[14] physical exam's methods for screening of myofascial pain of the pelvic floor are highly variable and sometimes poorly defined, which has led to the creation of a concise model of physical exam for that purpose that can be reproduced anywhere.

In this present study, evaluation of pain was classified as superficial or deep. The first one involving the following: Perineal body, bulbospongiosus and superficial transverse perineal muscles. In the other hand, deep pain was perceived when it was felt in the puborectalis muscles and the obturator internus muscle; being both closely related to the surgical technique of the UI procedure involving meshes.

CPP syndrome is defined as persistent pain in the pelvic area, lasting more than 6 months, substantial enough to limitate functionality and non-related to the menstrual cycle, pregnancy, local trauma or pelvic operations.[15] In our study, patients with HPF had a 5.37x higher chance of presenting pain (any type). The proportion of patients referring deep pain between groups was also statistically significant, where patients with HPF had a 5.6x higher chance of presenting deep pain, as opposed to patients without HPF.

Pain perceived in the PFM, connective tissue and adjacent fascia is named myofascial pelvic pain, and it is associated with muscular pain, tense bundles, and trigger points (a sensitive area in the muscle or connective tissue that becomes painful when pressed).[16] These trigger points can exist in other regions of the body, such as the suprapubic area, the inferior part of the abdomen, the lumbago (lower back), the inner thigh and the buttocks. It can be classified as a syndrome of its own and cause pelvic pain, or it can be related to other abdominopelvic pathologies. Due to lack of proper training in the physical exam of the PFM during medical residencies, this pathology has been historically underdiagnosed and, therefore, undertreated.[16]

Our study emphasized the physical and functional exam of the PFM, as well as standardized its evaluation, aiming at the correct patient's care and diagnosis.

Previous studies conducted through anamnesis and physical exam with patients complaining of CPP due to myofascial pain or trigger points localized in the pelvic floor found out that 13.2% of the patients had pain related to the PFM.[17] Pain perceived in the levator ani muscle for a period longer than 7 years was discovered in 22% of the women studied.[18] In another observational study with 48 healthy female volunteers and 108 women presenting CPP by Montenegro et al.[19] PFM sensitivity was an isolated finding in 15% of the sample, whereas it was

associated with other pathologies in 58.3% of the women versus 4.2% of healthy volunteers. In the CPP group, 89% of the women had sensitivity in the levator ani muscle; 50.8% presented it in the piriformis muscle and, at last, 31.7% had sensitiviy in the obturator internus muscle by the same authors.[19] The importance of this last muscle, the obturator internus, is that it is located on the topography of the suture stitch in the transobturator sling procedure, one of the most famous techniques for treatment of UI.

Persistent postoperative pain has in its main risk factors, identified in several studies, the younger age; previous history of preoperative pain; and psychological risk factors such as catastrophizing pain (situation in which there is tendency to describe the pain experience in a more exaggerated way than the average person, ignoring possible better outcomes) by Cameron et al.[5]

Our data corroborates the risk factors above: People with HPF were statistically younger than women without this condition (median age 8.5 years less than women without HPF). Women with HPF had a between 34.5 and 46.75 years, while patients without HPF had between 41 to 54 years.

After our study, it has become clear the need for a better way to evaluate patients through physical examination before undergoing surgery for the treatment of UI, as some pathologies of the pelvis and previous history of the patient may influence the postoperative period and, therefore, the success of the procedure and patient's quality of life.

The manuscript has a supplementary material: A video presenting the outcomes and suggested physical examination standardization for pelvic pain assessment (Supple Video).

CONCLUSION

The data suggest a correlation between the presence of HPF and CPP in patients with urinary incontinence. These subclinical diseases can be identified and treated in the preoperative period, minimizing the likelihood of being attributed to a complication of pelvic surgery and providing a better quality of life for the patient. We suggest more studies concerning this topic, with a larger sample size, and a standardized physical exam before surgery, aiming at the early diagnosis of these conditions.

ETHICS

Ethics Committee Approval: The research project was approved by the Research Ethics Committee of Faculdade Inspirar (opinion number: 1,833,987); and was approved by the Co-participant Institution, HC-UFPR-Hospital de Clínicas of Federal University of Paraná (opinion number: 2,520,073).

Informed Consent: Patients were previously informed about the objective of the study, agreed to participate, and signed a free and clarified consent form.

Peer-review: Externally peer-reviewed.

Contributions

Surgical and Medical Practices: D.B.; Concept: D.B., R.D.F., C.E.F.B., M.R.S.; Design: D.B., R.D.F., C.E.F.B., M.R.S.; Data Collection or Processing: D.B., C.E.F.B., C.V.M., M.R.S.; Analysis or Interpretation: D.B., R.D.F., C.V.M., M.R.S.; Literature Search: D.B., R.D.F., D.V., C.E.F.B., C.V.M.; Writing: D.B., D.V.

DISCLOSURES

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

Video Link: http://glns.co/2ok1a

REFERENCES

1. Duckett J, Bodner-Adler B, Rachaneni S, Latthe P. Management of complications arising from the use of mesh for stress urinary incontinence International Urogynecology Association Research and Development Committee opinion. Int Urogynecol J 2019; 30: 1413-7.
2. U.S. Food and drug administration. Available from: https://www.fda.gov/
3. Speer LM, Mushkbar S, Erbele T. Chronic Pelvic Pain in Women. Am Fam Physician 2016; 93: 380-7.
4. Aredo JV, Heyrana KJ, Karp BI, Shah JP, Stratton P. Relating chronic pelvic pain and endometriosis to signs of sensitization and myofascial pain and dysfunction. Semin Reprod Med 2017; 35: 88-97.
5. Cameron B, Sabourin J, Sanaee MS, Koenig NA, Lee T, Geoffrion R. Pelvic floor hypertonicity in women with pelvic floor disorders: A case control and risk prediction study. Neurourol Urodyn 2019; 38: 696-702
6. Persu C, Chapple CR, Cauni V, Gutue S, Geavlete P. Pelvic Organ Prolapse Quantification System (POP-Q) – a new era in pelvic prolapse staging. J Med Life 2011; 4: 75-81.
7. Palma PCR Berghmans B, Seleme M, et al. Guia de Prática Clínica da Associação Brasileira de Fisioterapia Pélvica in Urofisioterapia: aplicações clínicas e técnicas fisioterapêuticas nas disfunções miccionais e do assoalho pélvico. 2014. Ed.2. São Paulo: AB Editora. 574 p.
8. Berghmans B, Seleme MR, Bernards ATM. Physiotherapy assessment for female urinary incontinence. Int Urogynecol J 2020; 31: 917-31.
9. Burón DF, Marcos Vidal JM, Baticón Escudero PM, Montes Armenteros A, Bermejo López JC, Merino García M. Concordancia entre la escala verbal numérica y la escala visual analógica en el seguimiento del dolor agudo postoperatorio. Revista Española de Anestesiología y Reanimación 2011; 58: 279-82.
10. Jantos M, Johns S, Torres A, Ska EWAB. Original article Mapping chronic urogenital pain in women: Review and rationale for a muscle assessment protocol - Part 1. Pelviperineology 2015; 34: 21-7.

11. DeLancey JO. Anatomy and biomechanics of genital prolapse. Clin Obstet Gynecol 1993; 36: 897-909.

12. Norton P. Pelvic floor disorders: the role of fascia and ligaments. Clin Obstet Gynecol 1993; 36: 926-38.

13. Wallace SL, Miller LD, Mishra K. Pelvic floor physical therapy in the treatment of pelvic floor dysfunction in women. Curr Opin Obstet Gynecol 2019; 31: 485-93.

14. Meister MR, Sutcliffe S, Ghetti C, et al. Development of a standardized, reproducible screening examination for assessment of pelvic floor myofascial pain. Am J Obstet Gynecol 2019; 220: 255.e1-e9.

15. Grinberg K, Sela Y, Nissanholtz-Gannot R. New Insights about Chronic Pelvic Pain Syndrome (CPPS). Int J Environ Res Public Health 2020; 17: 3005.

16. Bonder JH, Chi M, Rispoli L. Myofascial Pelvic Pain and Related Disorders. Phys Med Rehabil Clin N Am 2017; 28: 501-15.

17. Bedaiwy MA, Patterson B, Mahajan S. Prevalence of myofascial chronic pelvic pain and the effectiveness of pelvic floor physical therapy. J Reprod Med 2013; 58: 504-10.

18. Tu FF, As-Sanie S, Steege JF. Prevalence of pelvic musculoskeletal disorders in a female chronic pelvic pain clinic. J Reprod Med 2006; 51: 185-9.

19. Montenegro ML, Mateus-Vasconcelos EC, Rosa e Silva JC, et al. Importance of pelvic muscle tenderness evaluation in women with chronic pelvic pain. Pain Med 2010; 11: 224-8.