

# Chronic pelvic pain and uterosacral ligaments: a systematic review

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**Abstract:** *Introduction.* According to the Integral System, chronic pelvic pain (CPP) in the female co-occurs with abnormal bladder emptying, urge and nocturia symptoms with a common causation, lax uterosacral ligaments (USLs). *Methods.* In our systematic review, the PubMed database was used for the literature search using the keywords algorithm which included "chronic pelvic pain" and "uterosacral ligaments". Relevant studies regarding CPP origin, USLs involvement in causation and symptom cure after surgical or non-surgical treatment were analysed in this review. *Results.* We found evidence that when USLs become lax, the gravity forces act on the uterus and vagina, develop congestion. In this respect, posterior compartment repair could be used in order to reinforce the USLs. *Conclusions.* CPP and other symptoms related to posterior zone of the pelvic floor were mainly due to USL laxity and repairing these ligaments restored its clinical manifestations, as predicted by the Integral Theory.

**Keywords:** Chronic pelvic pain; Uterosacral ligaments; Laxity; Pelvic floor; Posterior zone.

## INTRODUCTION

Chronic pelvic pain (CPP) is a disabling disease which occurs in almost 20% of the female population<sup>1</sup>, decreasing the patient's quality of life<sup>2</sup>. Although the pathogenesis of the disease is still said to be unknown, the main treatments include psychotherapy, drugs, laparoscopic nerve ablation, hysterectomy which implies the removal of the ovary and/or neuromodulation with better results<sup>3,4</sup>.

CPP was described as being part of a specific symptom complex, according to the Integral Theory published in 1993<sup>5,6</sup> also known as the 'posterior fornix syndrome'. This comprises chronic pelvic pain, urge, nocturia, abnormal bladder emptying and is mainly due to laxity in apical support<sup>7</sup>.

The USLs laxities were showed to be caused by age related collagen reduction from the ligaments or weakening from depolymerisation of hormones, at menstruation and especially during pregnancy<sup>6</sup>. Uterus represents the organ which sustains the main structure of the pelvic floor. Although it has such an importance, many physicians still recommend the removal of the uterus together with the ligaments in different pathologies.

Interestingly, at menopause, ovaries lose the production of estrogen and if another complication occurs like hysterectomy, the ligaments will not be able to maintain the pelvic floor structures. Moreover, by applying hysterectomy, the blood supply can be reduced to the vaginal apex, including USLs and cardinal ligaments. Taken together, all these negative factors start to develop the posterior zone symptoms<sup>6</sup>. Initially, in 1996, treatment of these symptoms was mainly achieved by uterosacral ligaments (USLs) plication<sup>8</sup>. However, because of these pathogenic factors which damage the main structural components of USL, collagen, tapes were added to create new collagen to structurally reinforce damaged USLs for cure of apical prolapse and posterior fornix symptoms<sup>9</sup>.

Our systematic review aims to provide an emerging update about the relationship of USLs to causation of CPP and cure thereof by USL reconstruction.

## METHODS

### Literature Search

This systematic review was conducted by screening and gathering results of research papers from literature search

in PubMed database. External sources were not used. Relevant studies were searched by using keywords algorithm: "chronic pelvic pain" [All Fields] AND "uterosacral ligaments" [All Fields].

### Inclusion and Exclusion Criteria

The articles from the database with the keywords input were screened and analyzed (n = 15) with the PRISMA guidelines<sup>10</sup> using the following criteria: (i) original articles; (ii) published in English language; (iii) published within year 1986-2018; (iv) CPP origin, USL involvement, surgical and non-surgical treatment; (v) qualitative and/or quantitative studies; and (vi) studies assessing the involvement of USL in the CPP origin (Figure 1). We excluded conference abstracts, letters, and review articles.

### Data Extraction

We gathered all of the full-text articles that met the inclusion criteria. The results from 5 research articles that are relevant to this review were extracted and analyzed. The outcomes of the studies were comprehensively analyzed and discussed.

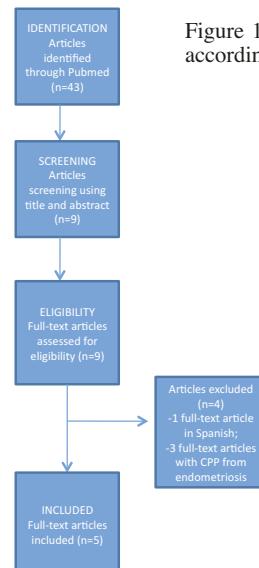


Figure 1. – Methodology for articles selection according to PRISMA review guidelines<sup>10</sup>.

## RESULTS

### Study characteristics

We found 48 articles from which 5 were reviews (from which one had the full-text in French language). From 43 articles, we screened 9 full-text articles (34 were only abstracts from which 4 with only the title and 1 abstract with the text in Portuguese). From 9 full-text articles, we excluded 4 full-text articles: one with full-text in Spanish and the other three in which the CPP was referred to endometriosis cause. Finally, we included only 5 articles for analysis. Furthermore, we did not find any conference abstracts.

Studies that were used in this review where focusing more on CPP origin, USLs involvement, taken into consideration the surgical or non-surgical treatment (Table 1). The studies used in this review have a low to moderate level of certainty.

In the study of Liedl and contributors<sup>11</sup>, the origin of CPP was the symptoms from apical prolapsed of 2<sup>nd</sup> or greater degree (POPQ, stages 2-4) including overactive bladder. After applying surgical treatment by using Integral Theory System with TFS, in order to repair the loose of cardinal and US ligaments, the patients presented improved symptoms and better clinical quality of life.

In another study<sup>12</sup>, the authors made the surgical excision of the deep retractive pockets, improving in this way the symptoms such as CPP. It was also shown that women who had endometriosis in their deep retractive pockets, had significant improvement in deep dyspareunia and quality of life.

Another study made a combination of quantitative and semiquantitative techniques for the pain track<sup>13</sup>. The examination of the pain had different regions like pelvic abdominal wall, vulvar vestibule, pelvic floor and the vaginal vault. The study approach involved pain pressure threshold algometry and standardized numeric scale. By using these methods, it was showed to better quantify the pelvic pain complexity and that the pain in the abdominal walls, pelvic floor and USLs should be separately evaluated.

Another study<sup>14</sup> involved 487 women with chronic pain lasting more than 6 months with or without minimal endometriosis. The patients were randomized according to laparoscopic uterosacral nerve ablation (LUNA) group or no LUNA group. The main symptoms were achieved by using Visual Analogue Scale (VAS), Euro-QoL (EQ-5D) or EQ-VAS. The results of the study showed that LUNA did not result in improvements in pain, dysmenorrheal, dyspareunia,

pelvic pain or QoL compared with no LUNA group (i.e. without pelvic denervation). In the protocol of The LUNA Trial Collaboration<sup>15</sup> it was tested the hypothesis if in women with CPP LUNA can alleviate pain at 12 month follow-up. After the surgery, questionnaires like VAS, an index of sexual satisfaction and the EuroQoL SD-EQ instrument was administered at 3, 6 and 12 months. The study showed that the LUNA effectiveness may be higher for central compared to non-central pain without any other associated diseases.

## DISCUSSION

### *The role of uterosacral ligaments laxity in chronic pelvic pain*

Although CPP represents a continuous important issue in daily medical practice, on many occasions it is underdiagnosed and undertreated by most of the physicians. A simple initially effective treatment was reinforcement of the ligaments laxity which supports the uterus and vagina<sup>8</sup>.

Though vaginal USL plication showed an initial 85% improvement from the pain relief, there was further deteriorated in time<sup>8</sup>. Following this, insertion of a posterior vaginal sling showed a greater improvement of the symptoms<sup>16</sup>.

One characteristic of this pain related to mechanical factors. The pain was exacerbated when standing and relieved on lying down. This is explained by the inadequately supported nerves being stimulated by gravitational forces. It is unfortunate that such pain is often attributed to psychological issues<sup>17</sup> which in fact may be secondary, not primary. It is therefore important that laxity in the posterior ligaments be first checked before considering other differentiating diagnosis like psychiatric case<sup>8</sup>.

Knowing that the nerve fibers from USLs are visceral fibers, visceral innervations including those from T12-L1 and S2-4 would explain the pain distribution, although the stretching of the ligaments by gravity will also stimulate the nerve ending causing in this way pain.

The first step in reducing the pain is to ask the patient to lie down, decreasing the pressure<sup>8</sup>. Then, the second step could be represented by pessary application which can provide the normal mechanical support of the ligaments<sup>8</sup>. The congestion characteristics could be explained by the following: uterus is supported by both cardinal and USLs, assisted together with the pelvic floor muscles. When the ligaments become lax, the gravity forces acting on the uterus could develop congestion by “kinking” of the pelvic veins, preventing in this way the outflow<sup>18</sup>.

TABLE 1. Comparison of the included full-text articles.

| References | CPP origin   | USLs involvement   | After surgical treatment  | Non-surgical treatment  |
|------------|--|--|---|---|
| 7          | 2nd degree or greater uterine/apical prolapse  | Loose of USLs  | USL repair using TFS by applying Integral Theory System           | –   |
| 8          | Deep retraction pockets in the posterior cul de sac  | USLs elasticity  | Pockets excision (defined as estimated to be greater than 0.5 cm) | –   |
| 9          | Hypothesized areas:<br>- abdominal wall;<br>- vulva;<br>- pelvic floor;<br>- vaginal vault | Traction applied to USLs   | –   | Using pain pressure threshold algometry and standard numeric scale  |
| 10         | Nerve trunks interruption in the USLs  | Operative of nerve trunks interruption in the USL by laparoscopic uterosacral nerve ablation | –   | Visual analogue scale questionnaire at 3 and 6 months and 1,2,3 and 5 years at women with CPP with or without laparoscopic uterosacral nerve ablation treatment |
| 11         | The Lee-Frankenhauser sensory nerve plexes and parasympathetic ganglia in the USLs         | Nerve trunks interruption by laparoscopic uterosacral nerve ablation                         | Laparoscopic uterosacral nerve ablation                           | –   |

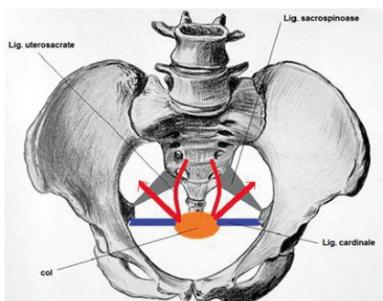


Figure 2. – The posterior vector resultant of the ligaments supporting the cervix.

### The posterior compartment repair of the pelvic floor

The looseness or laxity of the vagina and its ligaments supports can cause CPP, organ prolapse, urge and stress incontinence, nocturia, voiding dysfunction, faecal incontinence and constipation<sup>19,20</sup>.

The pain usually appears from the inability of USLs laxity to support the nerves near the ligaments. These nerves are stretched by gravity or during intercourse and cause CPP. This pain is almost invariably associated with other symptoms like nocturia, faecal incontinence and obstructed defecation<sup>20</sup>.

It is important to understand that tissue structure is often displaced laterally (e. g. cardinal ligaments, USLs, rectovaginal fascia, pubocervical fascia, hammock, and perineal body). Therefore, effective posterior compartment surgical techniques are required to bring the tissues together in the anatomically normal position<sup>21</sup>.

Physiologically, the uterine ligaments provide the posterior cervical support component of the uterine cervix, and the cardinal ligaments provide the lateral component. Translated in biomechanical language we speak of a “tension in the thread” that opposes the displacement of the cervix, one rearward oriented and the other side. The result of these forces is a vector with posterolateral orientation (Figure 2).

Any reconstruction technique should target the ligament reconstruction whose vector result is similar to the physiological result. The disappearance of postoperative pain should confirm the cause-effect relationship between USLs and CPP.

### Limitations and Future Research Suggestions

It is known that CPP is specific for the posterior zone. The diagnosis of posterior zone is detected when the patient has urgency nocturia, and especially CPP<sup>22</sup>. The limitation of our study consisted in that we followed only the USLs involvement without assessing the state of the perineal body which constitutes part of the back ligaments.

### CONCLUSIONS

A key symptom related to posterior zone is the CPP. Knowing that the main underlying anatomical defect is deficiency and/or laxity of USL, the repair of these ligaments can lead to restoration of the structure and function, the clinical symptoms and manifestations.

### DISCLOSURE STATEMENTS

The authors declare no conflict of interest.

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