Pelvic Floor Dysfunction and Cycling

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Studies have pointed to the causal relationship between physical exercise performed on a bicycle and suffering from any kind of pelvic floor dysfunction (erectile dysfunction, pudendal neuralgia, etc.).

Some of the consequences arising from exercise performed on a bicycle, such as cycling, are the obstruction of the main nerve that irrigates the pelvic area, “the pudendal nerve”, mainly due to an extended period of training/competition or to the type of saddle (Jeong et al., 2002).

In a review, Sacco et al. (2010) report some sports that may be the cause of perineal compression (activities involving hip flexion while crouched like cycling or climbing may cause or worsen urogenital/pelvic pain). These could aggravate symptoms of acute and chronic prostatitis, making it convenient to temporarily stop doing sports. They could also cause entrapment of the pudendal nerve, leading to typical symptoms of prostatitis such as urogenital neuropathic pain along with urinary and sexual dysfunctions.

This topic is still largely unknown for Exercise Science professionals and physiotherapists. Thus, the main target of this article is to raise awareness among readers and to explain which preventive and rehabilitative techniques can be useful to manage perineal pathologies in sportspeople training on a bicycle.
SADDLE

In the last 10 years, cycling has gained popularity not only as a sport but also as a leisure activity (Asplund, Barkdull y Weiss, 2007). Yet, cycling means an exposure to sportive injuries, one of the most common being related to the urogenital system (Asplund et al., 2007; Toth, McNeill y Feasby, 2005). These risks come mainly from the compression of the saddle on perineal areas.

Using an appropriate saddle is essential for cyclists. They need to pay close attention to the contact with the most sensitive and thin parts of the connective tissue to avoid physical discomfort resulting from an inappropriate design or a maladjustment.

There are suitable saddles for women which are wider to accommodate the female pelvic structure, as women’s ischium are more separated (pelvis ginecoide) than men’s. Narrower saddles are more suitable for men. This difference in saddles depending on anatomic structure (women/men) is necessary for the prevention of sequelae or vascular problems.

For instance, a female cyclist riding on a man’s saddle will experience a strong pressure on the perineal area and therefore, physical discomfort and a reduction of the blood supply. If this kind of problem continues, they can cause histological changes in those regions under pressure, depending on the reorganization of the collagen fibers.

It is necessary to allow a correct mobilization of tissues to facilitate the exchange of body fluids. When this mobility is diminished, blood flow becomes slower and heavier, leading in extreme cases to ischemia. Those restrictions created by the motor impairment in the myofascial system facilitate the creation of trigger points and ischemia, decreasing the quality of the muscle fibers. As a result, the excessive stimulation of collagen production causes fibrosis in the myofascial system, automatically enabling the creation of
Layers of gel are normally added to saddles to cushion them, therefore broadening the area of pressure on genitals. According to reviews, there is a tendency to make female saddles even more cushioned, when they should actually be firm. Padding only means that the ischium will press down, having the same effect as riding on a high seat, they will put excessive pressure in the perineal region. It seems more functional to use a saddle tailored to the anatomic structure rather than the excessive padding of the saddle.

It is worth noting that the perineal region has a wide part of muscles with static function. Theses muscles are distributed in a strategic manner all over our anatomy assuring a set of hegemonies. *It is our way of keeping our functional survival and of assuring the ability to stand.*

**ATRAPMENT OF THE PUDENDAL NERVE**

Biking can cause different disorders in the genitourinary system due to both vascular and nerve compression. Especial attention must be paid to the compression affecting the pudendal nerve that innervates the perineum and the genitals.

Compression of the perineum can also lead to arterial insufficiency, another possible cause for numbness in the genital area as well as impotence.

In order to identify the sites of compression of the pudendal nerve, Gemery et al. (2007), developed a 3D digital model of an adult male pelvis and three models of saddles: a competition saddle, a classical saddle and a racing saddle with a central groove intended to reduce perineal pressure. The different pelvis positions related to each saddle can be observed in Figure 1.
Figura 1. Frontal views with pelvis positions corresponding to: A, a rider in a partial forward lean with arms extended; and B, a rider in a full forward lean as when using aerodynamic bars. (Images taken from Gemery et al., 2007).

The neurologist Dr. Amarenco first described the pudendal nerve entrapment in 1987. He came across this syndrome when a cyclist visited him complaining of pain in the pudendal area. Electrophysiological tests determined this syndrome that was first known as the “perineal paralysis of cyclist”.

The pudendal nerve has its origin at the sacral spinal segments: S2, S3 y S4, The 3 terminal branches have a different proportion of motor, sensory and autonomic fibers. Therefore, their entrapment can cause signs or symptoms in any of its 3 areas. According to Lema & Ricci, (2006), it is estimated that 30% will be autonomic and 70% will be somatic (50% sensory and 20% motor).

Hibner, et al., (2010) describe pudendal neuralgia as a painful condition poorly recognized by professionals. The International
Pudendal Neuropathy Association (tipna.org) estimates the incidence of this condition to be 1/100,000. However, most practitioners who treat patients with this condition feel the actual rate of incidence may be significantly higher due to their medical history and their physical condition.

Currently, there is a lack of medical literature and evidence regarding the diagnosis and treatment of pudendal neuralgia.

This diagnosis is based on the criteria described by Nantes et al. (2006).

Labat et al., (2008), state five basic diagnostic criteria for pudendal neuralgia: (1) Pain in the anatomical territory of the nerve.

**Figure 2.** Illustration of the pressure on the pudendal nerve cause by the saddle.

(2) Pain worsened by sitting. (3) The patient is not woken at night by the pain. (4) No objective sensory loss on clinical examination. (5) Positive anesthetic pudendal nerve block.

The main reason for pudendal neuropathy consultation is pain in
the anal and perineal region caused by sitting, relieved by standing, and absent when lying down.

It has neuropathic characteristics such as hypoesthesia sensation, numbness, perineal tingling and even electric discharges. It can be related to urinary, anal and even sexual dysfunction.

**ERECTILE DYSFUNCTION**

These syndromes of compression show up especially in the form of genital numbness which can lead to erectile dysfunction.

As stated before, the pudendal nerve obstruction can be a consequence of cycling, especially endurance races, and the kind of saddle. (Jeong et al., 2002). This factors could also cause a loss of sensibility, an increase of hip pain and, in the long-term, erectile dysfunction among men (McCory y Bell, 1999).

*Figure 3. Physiopathology of the nerve entrapment (Images from Itza et al., 2010)*
The first link between erectile dysfunction and cycling appeared when an urologist named Goldstein affirmed that more than one hundred men suffered from erectile dysfunction as a result of practicing cycling (Lema y Ricci, 2009). Even if a clear relationship is not established yet, there is a strong association with the paresthesia that appears immediately after competitions, suggesting a compression of nerves in the perineal area or an ischemia of vascular vessels in the same area (Asplund et al., 2007).

Sommer et al. (2001) reaffirm this hypothesis. They designed a study to determine if the compression of the perineum while pedaling a bicycle caused changes in the blood flow to the penis, impotence and numbness of the penis. They measured the penile oxygen pressure of forty male participants, with an average age of 30 years old. A reduction of 70% of the penile blood flow was found while they were pedaling, as well as a numbness in the region of the perineum in 61% of individuals. In addition, they reported problems of erectile dysfunction among cyclers who trained more than 400 km. per week.

Figure 4. Vascularization of male genitals
Scharder et al. (2002) compared 71 male cyclers (out of which, 91% had episodes of genital numbness) who were cycling 5.4 hours per day, with five healthy persons who were not using a bicycle. The study measured the pressure on the saddle of a fixed bicycle and posed a questionnaire about sexual function. In addition, erectile function during sleep was monitored every night. Results showed that the number of night erections during sleep was no different between the two groups although measures of erection quality were significantly smaller for the group of cyclers (27.1% ± 9.75% for cyclers in comparison to in 42.8% ± 13.2% for non-cyclers). The time is inversely correlated to the percentage of average hours on a bicycle, with the number of days per week and the pressure that is put on the front part of the seat. Authors conclude that these data indicate that the prolonged use of the bicycle can have negative effects on the night erectile function and points to the need of studding the new designs for saddles in order to reduce pressure on the perineal region.

Colebunders et al. (2011) make corpses studies to define with greater exactitude the pudendal canal or Alcock's canal. They conclude that the Alcock's canal is described in relation to the pupendal arteria, providing us a more precise approach of the part of the pudental nerve in the Obturator fascia.

In general, studies prove that there is a relation of causality between prostatitis and sport activities. On the other hand, urologists must take into account that sports implying activities of excessive hip bending or the prolonged perineal compression are not a rare cause of uro-andrology symptoms caused by the compression of the pudendal nerve.
PREVENTION AND THERAPY

In order to confront these problems, it is necessary to establish prevention and rehabilitation measures aimed at preventing possible injuries and reestablishing the function of the damaged pelvic floor as much as possible. Nowadays, the majority of treatments are medical, pharmacological and surgical, and they imply high costs. Further research on the possibilities offered by physical training and manual therapies for the prevention of such conditions is needed.

Even if they have not been researched for a very long time, a proposal of two new techniques for rehabilitation, less expensive, not painful and patient-friendly are described below.

Myofascial Techniques

It is described in a more generic fashion in other studies as “trigger point deactivation”, not explaining the treatment plan, only specifying data regarding pressure: 60” (Anderson et al., 2005), 8-12” (Holzberg et al., 2001), or 30-45” (Lukban et al., 2001) to explain myofascial techniques to treat chronic pelvic pain.

In a multicenter controlled study (FitzGerald et al., 2009), 48 individuals received specific treatment for 10 weeks, consisting in a control group (effleurage, petrissage, masotherapy) and an experimental group with specific myofascial techniques for chronic pelvic pain. The experimental group obtained 57% of success (trigger points, stretching and myofascial) in comparison to 21% in the control group.

Hypopressive techniques

A special mention is made to hypopressive techniques as they can
be a complementary and very promising tool for the rehabilitation of pelvic and perineal pathologies due to the increase of vascularization at a pelvic level that is observed during its performance with echo-doppler (Thyl, Aude, Caufriez and Balestra, 2009), counteracting the compressor effects that are described during the training on a bicycle. The next video shows in a very illustrative manner the difference between the more vascularizing actions of a hypopressive exercise in comparison to a more compressive one with doppler:

http://www.youtube.com/watch?v=r790zIYIS7Q

Let’s hope that in a near future, we will be able to learn more about the prevalence of pelvic and perineal dysfunctions in cyclers and to contribute with practical, preventive and easy-to-apply solutions.

**Figura 4.** Top mountain bike athlete doing hypopressive exercises. (Image courtesy of Ricardo Pérez, trainer of professional cyclers)
REFERENCES


McCory, P., y Bell, S. (1999). Nerve entrapment syndromes as a


