Does Bicycling Contribute to Erectile Dysfunction? Examining the Evidence

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Abstract: Bicycling is a popular means of recreation, transport, and fitness training for many people around the world, but questions have been raised about its threat to sexual function. This review summarizes some of the data on whether cycling is or is not an independent risk factor for erectile dysfunction and other sexual complaints. Space limitations will confine our discussion to men, although these problems are also important in women.

Keywords: erectile dysfunction; cycling; perineum

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Introduction

Bicycling is a popular recreational activity and means of fitness for many people in a wide age range, estimated at 80 million in the United States in 2002.[1] In light of the sobering prevalence and incidence of obesity in the United States, encouraging safe venues for cardiovascular fitness is important. Bicycling is a low-cost efficient mode of transport and offers a low-impact form of exercise.

Nevetheless, bicycling is not without risks. One review cited nearly 600 000 emergency room visits, 23 000 hospital admissions, and 900 deaths in a year.[2] The potential danger of cycling to erectile function was popularized in a 1997 article in *Bicycling* magazine, which quoted a well-known urologist who argued that "Men should never ride bicycles. Riding should be banned and outlawed. It's the most irrational form of exercise I could ever bring to discussion."[3] This statement was based on observations in clinical practice rather than on any published data. However, the article highlighted a potential problem and spawned an industry of new bike saddle designs and geometries purporting to minimize the possible erectile effects of cycling.[4] Several academic studies have since refuted the claim that cycling is an independent risk factor for developing erectile dysfunction (ED). This review summarizes the current literature on cycling and ED and provides concise recommendations that physicians can give to their patients.

Erectile Dysfunction and Cycling: Historical Perspective

Erectile dysfunction is a common and underdiagnosed problem, despite greater public knowledge and communication in the post-Viagra® era. One of the largest US epidemiologic studies, the Massachusetts Male Aging Study (MMAS), found that increasing age was a major predictor of ED. That study demonstrated a prevalence of 52% in those 40 to 70 years of age, and an approximately 10% increase in ED with every increasing decade of life.[5] In addition to age, many other vascular and neurologic comorbidities may contribute to the development of ED (Table 1).[6]

The idea that perineal pressure might be an additional risk factor for sexual dysfunction is hardly new. Hippocrates noted that the wealthy Scythians, a horseriding people, had considerably more problems with sexual dysfunction than the poorer Scythians who did not ride horses.

> Their bodies grow fat and squat…through their sedentary lives. A constitution of this kind prevents fertility. The men have no great desire for intercourse…. Moreover, the constant jolting on their horses unfits them for intercourse. Such are the causes of barrenness in the men…they are personally fat and lazy….
>
> This affliction affects the rich Scythians because of their riding, not the lower classes but the upper, who possess the most strength; the poor, who do not ride, suffer less.

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Table 1. Classification and Common Causes of Erectile Dysfunction.

Category of Erectile Dysfunction	Common Disorders	Pathophysiology
Neurogenic	Stroke or Alzheimer's disease Spinal cord injury Radical pelvic surgeries Diabetic neuropathy pelvic injury	Interrupted neuronal transmission Failure to initiate nerve impulse
Psychogenic	Depression Psychological stress Performance anxiety Relationship problems	Impaired nitric oxide release Over-inhibition of nitric oxide release Loss of libido
Hormonal	Hypogonadism Hyperprolactinemia	Loss of libido Inadequate nitric oxide release
Vasculogenic (arterial and cavernosal)	Hypertension Atherosclerosis Diabetes mellitus Trauma/bicycling accident Peyronie's disease	Impaired veno-occlusion Inadequate arterial inflow
Drug-induced	Antihypertensives Antiandrogen Antidepressants Alcohol abuse Cigarette smoking	Central suppression Decreased libido Alcoholic neuropathy Vascular insufficiency
Systemic diseases	Old age Diabetes mellitus Chronic renal failure Coronary heart disease	Multifactorial Neuronal and vascular dysfunction

> ….They do not handle the parts, but owing to cold and fatigue forget about sexual passion, losing the virility before any impulse is felt.[7]

Hippocrates attributed these problems to the long time spent in the saddle and a habit of cutting a vein behind the ear "to cut which causes impotence." This article focuses on bicycling, but also discusses saddles in general. Curiously, more modern research demonstrates that horseback riding does not appear to be linked to ED,[8] but motorcycling or the "iron horse" may be.[9,10]

Erectile Dysfunction and Cycling: Case Reports

Early data on this topic were derived from case reports linking cycling with penile numbness and/or ED. In 1981 a case was published describing a man who reported penile numbness after a 2-day, 180-mile ride; he was found to have diminished sensitivity to light touch along the penile shaft.[11] Another report described a patient who began having penile numbness and ED after beginning to use a stationary bike. This numbness progressed to almost total ED over the course of a year and resolved once he stopped riding.[12] Two other case reports[13] described, first, development of penile numbness in a triathlete after he switched to triathalon bars and a narrow firm seat. Neurologic studies indicated a pudendal neuropathy; symptoms resolved after the subject returned to traditional drop bars and a softer saddle. The second patient was hit by a car and sustained a perineal inury; he developed genital numbness when he returned to high-mileage cycling thereafter. After a period of not cycling, his symptoms resolved completely. It was suggested that the extreme forward lean resulting from use of the triathalon bars placed excessive pressure on the perineum as it tilted against the relatively narrow saddle, which resulted in compression of the pudendal nerve. In both cases, alteration of the riding position alleviated symptoms. Although these case reports represent a "low" level of evidence,[14] they formed the original impetus to study the potential problem in greater detail.

Cycling and Erectile Dysfunction: Population-Based Cohort Studies

Questionnaires surveying large numbers of cyclists have suggested a higher rate of ED compared with age-matched

Table 2. Summary of Selected Study Findings.

Authors/Year	Study Type	Major Study Findings
Schwarzer et al[15]	Population-based cohort	ED prevalence 13.1% vs 5.6% in controls
Andersen and Bovim[16]	Population-based cohort	21% genital numbness (men), 13% with ED after ride
Taylor et al[17]	Population-based cohort	17% ED (similar to noncyclist rates), those with longer riding history had lower ED than those who had been riding for less time
Marceau et al[19]	Population-based cohort	Moderate and sport cyclists have less than noncyclists; moderate cyclists still have less ED even when controlling for comorbidities
Schrader et al[32]	Saddle design and perineal pressure	Increased riding time correlated with less % sleep time with erections, although no decrease in number/rigidity of erections
Lowe et al[36]	Saddle design and perineal pressure	Peak perineal pressures highest for traditionally shaped saddles
Schrader et al[39]	Saddle design and perineal pressure	Use of noseless saddles improved numbness and erectile function
Keytel, and Noakes[42]	Saddle design and perineal pressure	Use of the wider saddles improved "saddle symptoms"
Nayal et al[43]	Penile blood flow	Flaccid glans oxygen pressure decreases during seated cycling
Sommer et al[44]	Saddle design and perineal pressure	Flaccid glans oxygen pressure decreases during seated cycling
Jeong et al[46]	Saddle design and perineal pressure	Flaccid glans blood flow decreases during seated cycling, although it decreases less if using a wider/more padded saddle
Cohen and Gross[47]	Saddle design and perineal pressure	Flaccid glans blood flow decreases during seated cycling, but saddle design (cut-out vs traditional) made no difference
Munarriz et al[48]	Saddle design and perineal pressure	After penile injection, cavernosal artery peak velocities lower on all saddles with nose extensions, whether cut-out or not

Abbreviations: ED, erectile dysfunction.

noncyclists: one such study reported a prevalence of ED of 13.1% in long-distance cyclists, compared with 5.6% in age-matched noncyclists.[15]

Anderson and Bovim[16] reported on impotence and neuropathies (both genital and in the hands/fingers) in participants of a long (324-mile) 1-day amateur bicycling tour in Norway. Of the respondent men, 21% had genital numbness of variable duration, although none of the women reported any corresponding symptoms. In 6% of the respondents, this numbness lasted at least a week. Numbness was correlated to hand weakness and was inversely correlated to the frequency of pauses (ie, time off the saddle) during the ride. Thirteen percent of the respondents reported ED after the ride, and 7% reported that this numbness lasted at least a week. Only two riders reported ED without numbness. ED was correlated with previous ED after previous long tours; interestingly, almost no subjects had ED after tours of less than 100 miles.

One of the strongest studies refuting cycling's role in the development of ED was the extensive questionnaire-based study by Taylor et al.[17] They surveyed US cycling clubs and asked questions about erectile function, medical history, and variables associated with cycling. Among 688 respondents, 17% were found to have ED, with age-stratified rates comparable to age-stratified rates reported in the Massachusetts Male Aging Study (MMAS)[5] and the National Health and Social Life Survey.[18] Miles per week, angling the saddle up or down, the use of aero/triathalon bars, and the degree of seat padding were not found to have a relationship with ED. In multivariate analysis, the only significant independent risk factor was age (a finding reported in most studies of ED), also suggesting that bicycle riding has no effect on erectile function. The presence and duration of parasthesias after riding was found to be associated with ED, but the commonly purported risk factors for perineal compression were not found to be associated with ED. Of note, cyclists with a long history of cycling had a lower rate of ED than those who had been riding for fewer years, which raises the possibility that the relationship between cycling and ED is confounded by cycling time, age, and overall health status. These factors have not been convincingly ruled out in clinical studies. An alternative explanation is that riders with genital complaints stop riding. Conversely, inexperienced riders may have genital complaints, which in part result from relatively poor fit on their bicycles.

To explore the relationship between cycling and ED when adjusting for age and health status, the MMAS revealed no relationship between bicycle riding and ED. In this study,

cyclists were categorized as riding less than (moderate) versus more than (sport) 3 hours a week. In general, ED rates in noncyclists, moderate cyclists, and sport cyclists were 21%, 11%, and 17%. This study has often been quoted to demonstrate that cycling more than 3 hours a week is a risk factor for ED but the logistic regression analysis showed that cycling was in general protective, in that both moderate and sport cyclists had less ED than noncyclists (odds ratios of 0.48 and 0.82, respectively). This result was true when not controlling for covariates such as age, smoking, and medical illnesses and remained so when these covariates were controlled for, at least in moderate cyclists.[19] Although this study has been criticized for small sample size and inadequate power, it emphasizes the important point that a sedentary lifestyle is an important risk factor for ED and that, in the MMAS study in general, the lowest levels of ED were found in men who began exercising or continued exercising between baseline and follow-up time points.[20]

ED and Cardiovascular Risk

A growing body of literature supports the idea that the presence of ED may be a warning sign for underlying cardiovascular disease, with the small penile arteries manifesting disease prior to potentially life-threatening problems such as cardiac or cerebral events.[21–24] Indeed, the reversal of risk factors for cardiovascular disease may actually improve erectile health and function. A unique, randomized Italian study randomly assigned obese men to receive detailed advice on how to achieve weight loss via exercise and diet, or to receive general advice (control group). The study demonstrated normalization of erectile function in one third of the obese men with ED, and the majority reported at least some degree of improvement in their function.[25] Similarly, other studies have demonstrated improvement in ED in obese patients who lost weight.[26,27] Therefore, cardiovascular exercise such as cycling may exert a protective effect on erections.

Anatomy of Erections and Penile Sensation

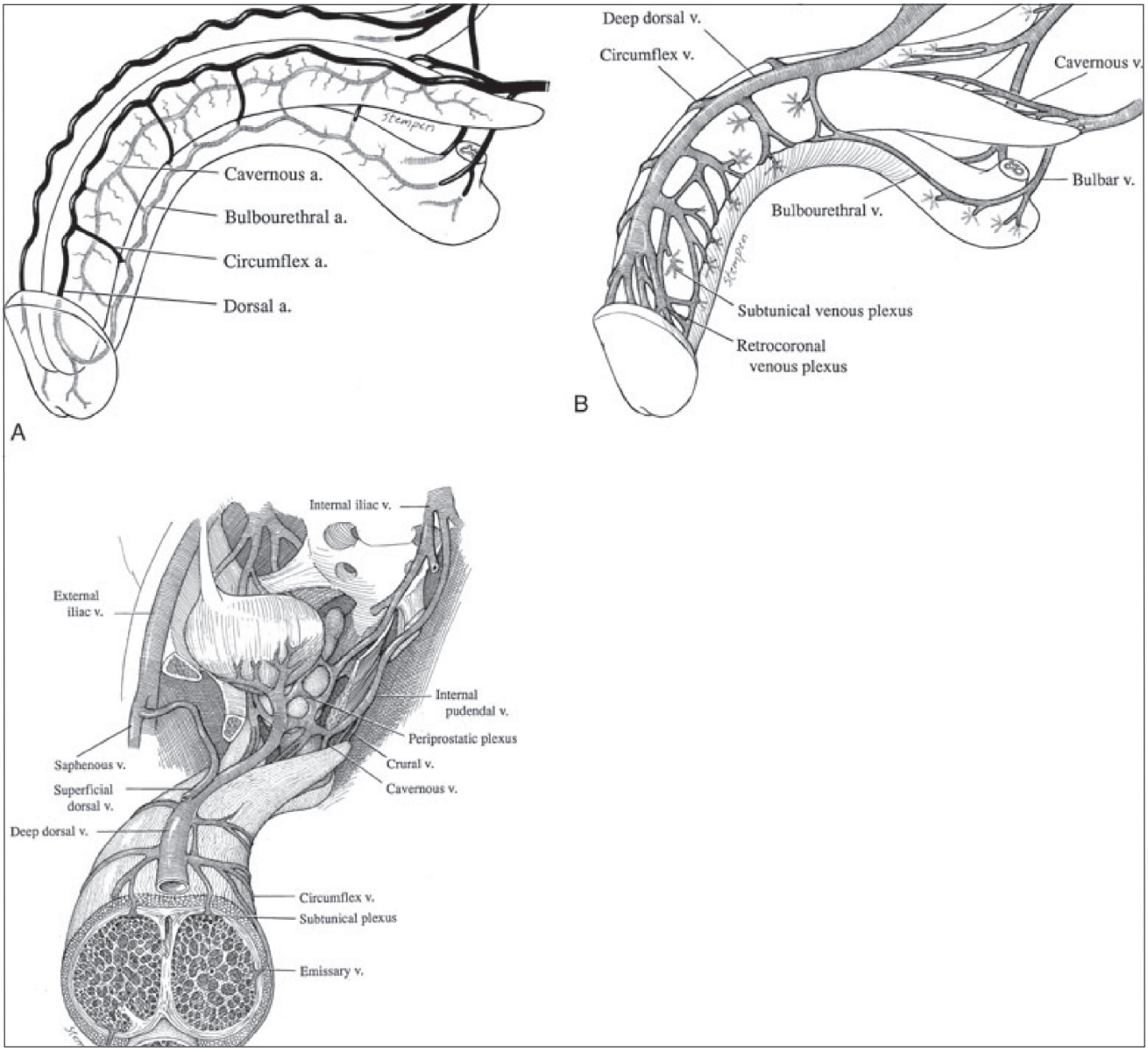
The penis is essentially a tripartite structure, with two erectile bodies (the corpora cavernosa) and a unit comprised of the glans penis and the associated corpus spongiosum, which surrounds the urethra (Figures 1, 2). Most of the sensate nerves of the penis, such as those responsible for sexual pleasure, are concentrated in the glans penis and run dorsally in the penis as the paired dorsal nerves. Erections occur as a result of increased arterial inflow after stimulation of the cavernous nerves. Smooth muscle relaxation in the corpora cavernosa allows arterial ingress and prevents venous egress. Sympathetic neural discharge accompanying ejaculation allows smooth muscle contraction and a reversal of the process, with accompanying egress of blood in the corpora cavernosa.

The main source of blood supply to the penis is usually through the internal pudendal artery, a branch of the internal iliac artery. The internal pudendal artery becomes the common penile artery after giving off a branch to the perineum. The three branches of the penile artery are the dorsal, bulbourethral, and cavernous arteries. The cavernous artery is responsible for tumescence of the corpus cavernosum and the dorsal artery for engorgement of the glans penis during erection. The bulbourethral artery supplies the bulb and corpus spongiosum. The cavernous artery enters the corpus cavernosum at the hilum of the penis, where the two penile crura merge. Distally, the three branches join to form a vascular ring near the glans. Along its course, the cavernous artery gives off many helicine arteries, which supply the trabecular erectile tissue and the sinusoids. These helicine arteries are contracted and tortuous in the flaccid state and become dilated and straight during erection.

The penis is supplied by both somatic and autonomic nerves. The somatic dorsal nerves provide sensory stimulation for the penile skin and glans, and approximately follow the course of the dorsal penile arteries, eventually becoming the pudendal nerve (after joining with other nerves) and entering the spinal cord via S_{2-4} nerve roots. Sympathetic autonomic fibers derive from the hypogastric plexus and join parasympathetic autonomic fibers from S2–4 in the pelvic plexus. Cavernous nerves represent the penile branches of the pelvic plexus that ramify once, piercing the corporal bodies, and thus contain both sympathetic and parasympathetic fibers.

The theory behind cycling-induced erectile problems is that the common penile artery, located medial to the inferior pubic ramus, bifurcates into the cavernosal and dorsal arteries just below the pubic symphysis. Furthermore, the pudendal nerve passes via the Alcock canal below the pubic symphysis. Both the arteries and nerves may become compressed between the saddle and pubic bones during cycling. Various authors have proposed that compression/injury occur between the seat and pubic symphysis[11,28] or within the Alcock canal medial to the ischial rami.[29]

Figure 1. Arterial and venous anatomy of the penis.



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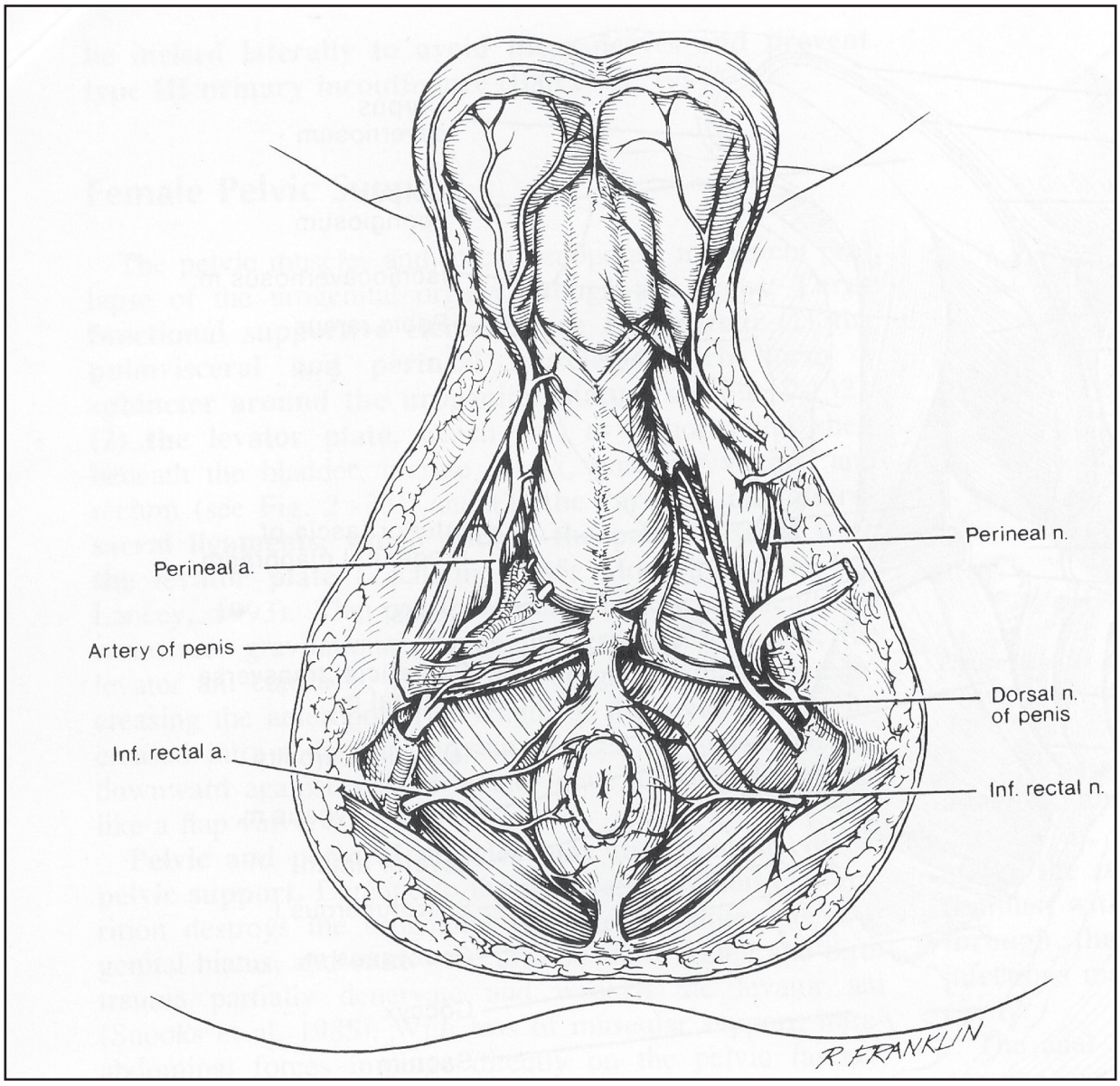
Two recent imaging studies support the hypothesis that compression of neurovascular structures underlie the possible relationship between cycling and ED. In the first, using computed tomography (CT), the authors demonstrated that an area below the pubic symphysis is indeed the site of greatest compression of the internal pudendal artery, particularly when the rider is leaning forward.[30] This study also evaluated different types of saddles. Saddles with full or partial central "cutouts" have been widely claimed to alleviate perineal pressure and thus decrease the risk of nervous or vascular compromise. However, the CT study found that, although cutout designs may add a small amount of potential space between the saddle and the pubic symphysis, the position of the rider played a much greater role and was the primary determinant of the

Figure 2. Perineal anatomy including arteries and nerves. The common penile artery, and the pudendal nerve (not shown) may become compressed either at the level of the pubic symphysis or in Alcock's canal medial to the ischial rami.



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available space. The second was a magnetic-resonance imaging study in which perineal and penile imaging was correlated with pressures generated by a bicycle saddle.[31] When the perineum was compressed with a bicycle saddle, there was a relatively invariant area below the pubic symphysis that was associated with maximal compression of the cavernosal spaces.

Relationship Between Saddle Designs and Sexual Dysfunction

In response to complaints about job-related sexual dysfunction, Schrader et al[32] of the National Institute for Occupational Safety and Health (NIOSH) began a series of influential investigations on cycling and different saddles used by police patrol officers. Because they were part of a bicycling unit, these

police spent a great deal of time on their bikes, both at rest and actively cycling (an average of 5.4 hours per day). Subjects filled out questionnaires and their nocturnal erections were assessed using a Rigiscan. The Rigiscan is a plethysmography tool that is worn on the penis at night and assesses penile fullness/rigidity during sleep. Although its use and role in studying ED is controversial, the Rigiscan has been used as a means of documenting the presence or absence of erections during rapid eye movement (REM) sleep (as opposed to erections resulting from erotic stimulation).[33–35] Pressures when seated on the saddle were measured although these could not be correlated with the actual pressures on the perineum. No mention was made of subject ages but, interestingly, no ED was noted on the sexual function questionnaire, the validated International Index of Erectile Function (IIEF). The Rigiscan data revealed no significant difference in number of nocturnal erections or their rigidity but did demonstrate that the percentage of sleep time in which men had an erection was significantly less in the cyclists. This decrease in erection time was correlated with increased riding time (both hours per day and days per week) and average pressure on the nose of the saddle. A problem with this study (and of most studies involving the Rigiscan assessment tool) is the lack of correlation between the Rigiscan findings and self-reported ED, as shown on the validated IIEF questionnaire, so that evaluating the significance of abnormal testing in the face of a normal condition is difficult.

This study was expanded to try to map the pressures generated by different saddles.[36] The expansion was largely the result of the resistance the group encountered in recommending nontraditional saddle designs to bike patrol officers. One issue was whether off-loading weight from the saddle might put added pressure on upper extremity muscles[37] or whether the lack of a saddle nose might predispose the rider to slipping off the saddle and potentially doing additional damage.[38] A pressure-mapping pad was used to calculate forces, and the location of the perineum was estimated rather than directly measured. Peak perineal pressures were highest for the traditional saddle, and the other designs demonstrated little variance, although the difference in average perineal pressure between traditional and nontraditional saddles was not as great. No increased pressures were found in either the hands or feet with the nontraditional saddle shapes.

A larger follow-up study by the same group surveyed 90 bicycle police officers using a saddle without a nose, and again looked at IIEF scores, pressure measurements, Rigiscan assessment, and biothesiometry.[39] At the end of 6 months of use, the researchers found improvement in biothesiometry findings, improvement in erectile function as assessed by IIEF, and fewer complaints of numbness. Almost all the officers were able to use the novel saddle for their work, despite the various misgivings cited previously. Curiously, there were no changes in Rigiscan assessments, despite the improvement in IIEF scores. Six months was possibly inadequate time to recover nocturnal erections, or maybe the results support the aforementioned disparity between clinical findings (IIEF) and noctural erection assessments (the Rigiscan).

The National Institute for Occupational Safety and Health (NIOSH) studies are unique because the population studied was 1) heavier and carried more weight than the average cyclist and 2), rode mainly in a slow, upright fashion, punctuated by occasional faster "pursuits". This group also tended to sit on the saddle while not actively moving, leaning against a pole or wall for support. Particularly on these latter occasions, they assumed a position in which most weight was supported in a static fashion by the saddle. This is similar to the model used by various groups wherein a saddle supported by a pole is pushed into the perineum in an attempt to recreate cycling pressures. However, a biomechanical study demonstrated that in active cycling, mean and peak saddle pressures decrease as the power output increases, and this is accentuated when the hands are in the handlebar "drops" versus the top of the handlebar.[40] Another study highlighted the role of both shear forces and vertical load forces during active cycling.[41] Thus, extrapolating the findings of the NIOSH studies to situations involving recreational or competitive cycling may not be possible. Furthermore, the conclusions of these studies are tempered by a lack of control groups.

In a study of a more generalized population, Keytel and Noakes[42] also compared two saddle designs, using experienced male and female cyclists. They compared a traditionally shaped saddle to one with a wider posterior region, which distributes weight primarily to the ischial tuberosities. The study did not use a validated questionnaire to evaluate numbness or ED specifically; rather, a more general symptom score looking at "saddle symptoms" (including chafing and back pain) and another score to assess saddle comfort was used. The study found that comfort was improved and saddle symptoms were decreased with use of the novel saddle, which was true from the first use onward. Most of the participants elected to stay with the novel saddle 3 months after the termination of the

study. Interestingly, close examination of the complaints of individual cyclists reveals that only one participant complained of baseline "loss of feeling in the pelvic area," a very low number considering the reported numbness but to a lesser degree than in other studies. Experienced cyclists, with presumably better positioning, may possibly suffer from numbness less than more novice riders. Alternatively, riders who experience these symptoms may give up cycling entirely although other studies[16] refute this latter claim. The general nature of the symptom questionnaire makes it difficult to judge the sexual elements of comfort but it is important to note the very prevalence of numbness even before use of the novel saddle.

Studies Examining Penile Blood Flow

Claims that bicycling affects ED should be supported by studies that look at blood flow in the cavernosal arteries. One of the earlier studies looking at blood flow, albeit indirectly, studied 25 men with a transcutaneous oxygen pressure device to examine oxygen pressure (pO_2) in the glans penis before cycling, and during both seated and standing cycling.[43] The study found that pO_2 increased to greater than baseline levels during standing cycling, decreased dramatically during seated cycling, and returned to baseline when examined after a 10-minute recovery period. A follow-up study by the same group found the same conclusions in a larger number of men.[44] A criticism of this study is that although oxygen pressure may correlate with blood flow, penile erections are the result of corporal blood flow rather than corpus spongiosum or glans blood flow. Moreover, these studies did not examine blood flow as related to erection (either via erotic stimuli or injection of vasoactive agents) but rather glans blood flow in the flaccid state, although the authors have also claimed in a different study that transcutaneous glans measurements correspond to cavernosal oxygen pressures after cavernosal injection of a vasoactive medication.[45]

Another study also looked at glans blood flow using a more direct laser Doppler flow meter in 20 men without ED.[46] As in the previous studies, the men were studied before and during cycling and were stratified by use of two different saddles: a narrow and unpadded one versus a wider and more padded one. Blood flow decreased when sitting on either saddle but was more pronounced with the narrower saddle. Once the subjects were actively cycling, the blood flow increased above baseline values, likely due to the generally increased flow associated with exercise.

A similar study looked at blood flow when subjects used a variety of saddles; some were smooth and some had central or longitudinal cut-outs.[47] Thirty active cyclists used several different saddles, and blood flow was measured in different cycling positions. As in the studies cited previously, seated cycling resulted in decreased blood flow compared with standing. However, the study showed no differences between the various saddle designs. Importantly, this study did not support the claim that the various cutout designs were protective against perineal compression.

Munarriz et al[48] looked specifically at corporal blood flow after intracorporal injection of vasoactive agents. This study examined subjects in several positions, including supine, sitting upright, and straddling one of several saddle designs. The study was not designed to look at cycling per se, but rather the perineal pressure exerted by differing saddle shapes (ie, static forces). Cavernosal artery peak systolic velocities were found to be significantly lower while seated on saddles with nose extensions, regardless of whether there was associated "cut-out" for the perineum. This study should serve to highlight (just as the CT study discussed previously[31]) that the solution may not be found in the myriad saddles with perineal "cut-outs" designed purportedly to solve the problem. Although these cut-outs may provide some subjective relief, the decreased surface area of the saddle contacting the perineum means an increase in pressure on the areas of perineum that are still in contact with the saddle. One study found an increase in pressure along the area of the pudendal nerves and vessels in those cyclists who used cutout saddles,[49] and another study confirmed that the use of cutout saddles conferred a higher risk of ED compared with a traditional saddle shape, particularly in those who had perineal numbness.[50]

A unique study directly examined the angiographic appearance of the pudendal artery in men with ED. In those with early-onset ED (35 years of age compared with those 53 years of age in most studied men), focal, nonatherosclerotic occlusive lesions were noted in the areas of the pudendal and penile arteries that would be most vulnerable to perineal injury. Six of the 20 men reported a history of perineal trauma, either direct minor trauma or chronic repetitive trauma such as cycling. This study suggests that even subclinical direct or chronic perineal trauma may cause vascular injury leading to ED in young men.[51]

Priapism

Several case reports of cyclists have shown sustained, discrete, acute injuries to the cavernosal artery, resulting in unopposed arterial inflow.[52–54] Generally, these have not been caused by chronic injury but rather an acute trauma to the perineum, such as falling onto a bike's top-tube. This may lead to a clinical scenario in which there is a painless, non-rigid erection. If conservative measurements do not work, this may require the aid of interventional radiologists or even surgical repair to close off the abnormal vessel.[55] However, these injuries, which may potentially result from any injury to the perineum, are too uncommon for a physician to recommend cessation of cycling for their avoidance.

Summary

With some evidence on both sides that cycling may be a risk factor for ED, should we encourage our patients to abandon their beloved means of transport, recreation, and fitness or to continue to embrace it? In general, however, a long-standing and robust body of literature supports the global (and penile) health benefits of cardiovascular fitness. The risk of possible rare cases of genital complaints must be weighed against the greater risks of anything that decreases cardiovascular health. Cyclists must be aware of easy steps they can take to minimize problems, although invariably some individuals should consider alternative forms of exercise if they have symptoms clearly related to their cycling. The general benefits are so compelling that we should continue to encourage lifestyle changes, including regular cycling.[25,27] Perhaps the Scythians of Hippocrates were less affected by their horseback riding than the fact that "their bodies grow fat and squat…through their sedentary lives. Such are the causes of barrenness in the men…they are personally fat and lazy…"[7]

Are There any Conclusions or Suggestions for the Physician who Treats Cyclists who may be Worried About ED or who Suffer from ED?

- Cycling should not be discouraged because the cardiovascular benefits are important to both overall and erectile health.
- The cyclist should choose a saddle that allows him/her to put most or all of their seated weight on their ischial tuberosities. Saddles with perineal cutouts are not necessarily protective, and multiple studies suggest that these saddles may be detrimental.
- A slight tilt downwards of the saddle nose (if present) may help offset some of the anterior compression.
- Make sure the height of the saddle allows for slight flexion of the legs at the lowest point of the pedal.
- The cyclist should try to minimize additional compression between the saddle and the pubic bones. In addition to tilting the saddle, cyclists should make sure that they stand up for at least 15 seconds every 10 minutes of cycling to "rest" the perineum.
- Being an experienced cyclist may be protective, probably due, in part, to a good "fit" and position on the bike. A professional or experienced fitter may be very helpful, especially for the novice or occasional rider.
- Recumbant bicycle designs put no stress on the perineum and are generally felt to have no risk of arterial or nervous compression.

Conflict of Interest Statement

William O. Brant, MD discloses conflicts of interest with Coloplast, TIMM Medical Technologies, Inc., Urodynamix Technologies Ltd., and American Medical Systems. Tom F. Lue, MD discloses conflicts of interest with Pfizer, Eli Lilly, Medtronic, Inc., and American Medical Systems. James F. Smith, MD, MS discloses no conflict of interest.

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