

Revisit The Correct Mechanism Of Urinary Incontinence For Surgical Intervention

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Abstract

Urinary incontinence (UI) as one of the manifestations of pelvic floor disorder (PFD) or pelvic floor dysfunction has been surgically managed for decades with reconstruction of weakened pelvic floor support based on integral theory (IT). This paper provides the holistic understanding of pelvic floor support system based on the concept of defecatory perineal disorder (DFD) that may pose challenges to IT which believe weakened “ligaments” is the main cause in PFD.

Keywords: Urinary incontinence, Pelvic floor disorder, Pelvic organ prolapse, Integral theory, Diagnosis, Sling surgery.

Introduction

Literally, urinary incontinence (UI) and pelvic organs prolapse (POP) are actually the manifestations of pelvic floor disorder and not the diagnosis per se. Solution with good prognosis is not possible without an accurate diagnosis. The purpose of diagnostic process is to find the cause or at least the main factors contributing to the problem. Comprehensive diagnosis consists of systemic analysis of the background or history, examination of the signs and symptoms, evaluation of the research or test results, and investigation of assumed or probable causes. The fact that the world is yet to have effective solution for UI and POP indicates that a thorough reevaluation of this issue is needed.

Issues in Integral Theory of Female Pelvic Floor

Integral theory (IT) believes “ligament” is the main causative factor in pelvic floor dysfunction. With the concept of IT, implantable meshes and slings were created and used to reconstruct the weakened “ligaments” [1].

There are lots of similarity between surgeries of UI and POP. For easier understanding, the subsequent discussion will elucidate specifically on UI and sling surgery. According to the concept of IT, the diagnosis or the cause of problem of UI is the weakness of pubourethral “ligament” (PUL). To treat the problem, mid-urethral sling was created and used as artificial PUL in the gold standard treatment for UI [1]. To tackle the problem of UI, we should first thoroughly examine all possible causes starting from the background of integral theory and its justification for intervention, diagnosis of UI, surgeon who perform the sling surgery, product used in the surgery and postoperative care of sling surgery.

The occurrence of sling surgery complications is not specific to any surgeon or specific brand of the product, this clearly implied that the two are unlikely to be the main factors. The Integral Theory (IT) also concurs that pelvic support system is influenced by multiple factors. Even posture and angulation of pelvic bone of a person play an important role in pelvic support. The most popular factor among all that contributes to total pelvic floor support is muscle and ligament [2].

Before the IT come into existence, the world has only one common version of pelvic floor support concept in which pelvic floor muscles play the most important role. Pelvic floor disorders (PFD) is accepted to be due to weakened pelvic floor muscle. Pelvic floor muscle has two important roles: (i) supporting role- mainly by the levator plate or the iliococcygeal part of levator ani, and (ii) constricting role- by puborectalis (PR) part of levator ani [3]. PR is a common constrictor which grip and hold the bladder, uterus and rectum in place by their respective urethra, vagina and anus. It also acts as common constrictor that is essential to maintain healthy sexual function and healthy continence function for anus and urethra.

PFD is synonym with Descending Perineal Syndrome (DPS) which was first described by Park in 1966. Park gave a very convincing etiopathology explanation for DPS/PFD by relating descended pelvic floor and straining for constipation in a vicious cycle which gradually weaken the pelvic floor musculature further [4]. Henry and colleagues

explored the idea to explain that constant straining associated with the bad vicious cycle and resulting further perineal descent which stretched the pudendal nerve and lead to incontinence [5]. Only recently Chew and Yu grouped the PFD with anorectal disorders and named them by their common etiological factor: Defecatory Perineal Disorder (DPD) [6,7]. The rationale is, for effective management of any medical problem, we need to treat the cause and not their manifestation. Defecatory Perineal Disorders (DPD) literal's meaning clearly carry the original understanding started by Park. Even before the terminology of DPD is used, everyone involved, from anatomist to surgeon have similar understanding: pelvic support is important and pelvic floor muscle is the main component of support. This is the rationale for widely accepted Kegel's pelvic floor muscle exercise. Based on similar concept levatorplasty was introduced. Likewise based on Ahmad Shafik's concept on perineology, Beco has proven by just external support at the levator plate, wide range of PFD including UI improved [8]. Besides that, there are many more managements of pelvic floor disorders like, sacral modulation, electromagnetic pelvic floor stimulation of pelvic floor which are evidence based and they are based on the understanding of muscle as the most important component of pelvic floor support. IT links pelvic floor muscles and ligaments in musculo-elastic theory with is a very doubtful rational and challenge the well-established anatomical knowledge. The connective tissue in continuity with muscle is called tendon, aponeurosis or raphe. Ligament may be anatomically adjacent to muscle or tendon but functionally ligaments are not directly related to muscle. There is nothing close to musculo-elastic theory in other part of human anatomy. This theory probably overestimates the role of the so called "ligament" which is actually fascia with areas of condensation [2]. Even if it is true, the "ligament" plays such significant role, its physical structure should have been overused causing hypertrophy and its size become proportionate to its function. In reality the so called "ligament" is so small. It is hardly visible in MRI and difficult to demonstrate during dissection of cadavers [9,10].

Diagnosis of UI

MRI clearly shows pelvic floor muscle [9,11]. Descending Perineal Syndrome (DPS) as described by Park can be objectively measured in MRI in reference to pubococcygeal line [11]. PUL is too small to be detectable by MRI [9,10]. This finding is contradicting with IT theory which claims the “ligaments” are more important than pelvic floor muscle. Ligaments are generally detectable by MRI. Ligament injuries in other part of body are diagnosed with MRI. In management of cruciate ligaments tear, MRI is routinely used in confirmation of the tear before a reconstructive surgery [12]. Artificial ligament used in reconstruction of the torn ligament is also made from the same material as pelvic mesh but never face complication as severe as that of pelvic mesh.

In treatment of UI, the need of reconstruction of PUL is mainly based on IT. MRI shows the descended pelvic floor muscle but the intervention is reconstruction of PUL.

Post-operative care of sling surgery

After sling implantation surgery, the sling as artificial PUL is undeniably the strongest structure in pelvic support system in the patient. The artificial PUL is put into use immediately after surgery. During defecation while the rest of pelvic floor descend as part of reflex of defecation [3], results in overloading of surgical site beyond physiological limit.

Studies show weakened pelvic floor especially the posterior aspect is strongly associated with constipation [14]. Pelvic floor descends during defecation about 3 cm even in normal individuals [15]. With straining, pelvic floor descends further.

Sling for UI only reconstructs the anterior part of pelvic support. The unattended PFD associated constipation due to sagging of posterior part of pelvic floor continue to burden on the surgical site. As time passes the accumulated damages plus the muscle wasting due to aging, the situation worsens and would eventually end up in complication.

UI is just one of the manifestations of general weakness of pelvic support system due to PFD or DPS. So, to rectify UI effectively, effort should not be limited to reconstruction of PUL only, it should be on how to improve and protect the general pelvic floor support.

It is undeniable fact transvaginal sling surgery for UI is evidence-based. Studies show patients after sling surgery found to have their UI problem fixed [16]. This was interpreted as sling, the artificial reconstructed PUL treated

UI. It is also taken as evidence to support IT. It would be more logical if the evidence is just interpreted based on Park's simple support theory. Actually, pelvic support in whatever form would benefit PFD. In the case of sling surgery, it is the support created with sling that contribute to fix UI. But the artificial support does not correct the general pelvic floor support. The uncorrected posterior compartment descend contributes to obstructive type of defecation or constipation [14]. With the chronic repeated overloading of surgical site during defecation plus the factor contributed by muscle wasting due to ageing, the surgery eventually gives rise to problem.

Scientists who support IT also started to aware the need of managing PFD including UI holistically including the associated obstructed defecation [1]. As a result of that IT concept has evolved from specific ligament reconstruction to tissue fixation system (TFS)[1]. This is supported by study done by Inoue and colleagues which showed the total TFS ligaments repair benefited wide range of manifestation of PFD [17]. The result of Inoue's study is actually similar to the fact by late Ahmed Shafik and also the similar to the result of the study by Beco [8]. The only difference is the intervention of Ahmed Shafik and Beco is on muscle whereas TFS is on "ligaments". It is a positive improvement for IT but skeptical that total TFS "ligaments" may not be sufficient to withstand the challenges of chronic straining during defecation which is increasing with ageing.

We have to be clear the priority is to solve the problem not which modality is better or which theory is correct. Everybody involve should be constructively work hand in hand to solve or at least stop the problem from worsening.

Conclusion

It is inaccurate to say the diagnosis or the cause of UI is due to weakened PUL. Evidence strongly supports the fact that the general weakness of pelvic floor support system is the cause of UI. MRI cannot show evidence to support diagnosis of damage PUL as the cause of UI, instead MRI can show clearly DPS, and the level of the pelvic floor muscle descend can be measured objectively. For better prognosis, PFD including UI and associated complication has to be managed holistically, more holistically than just total TFS ligaments repair. Exploring from all the angle, conservative first, invasive last. Mesh should be recommended only if really there is indication. Even if mesh is indicated, only the

type which can be easily removable should be allowed to be implanted.

Conflicts of interest

The authors declared no conflicts of interest.

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