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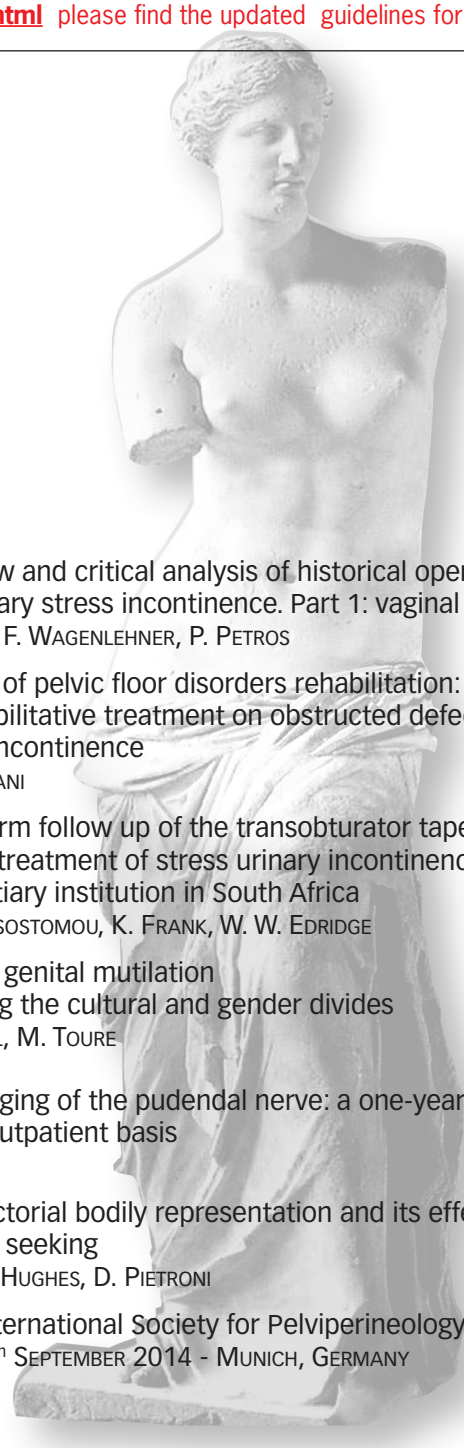

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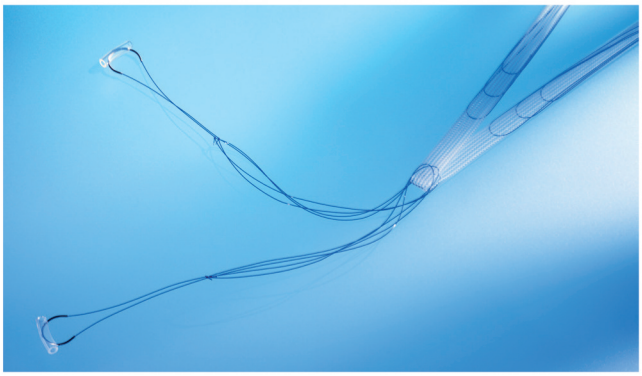

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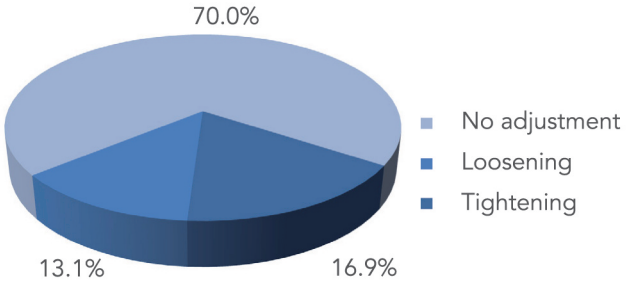

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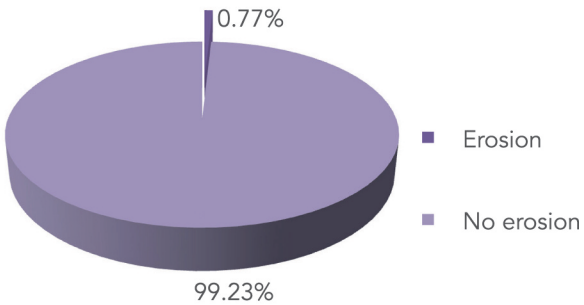

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Review

A review and critical analysis of historical operations for urinary stress incontinence. Part 1: vaginal surgery

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Abstract: Aim: To critically analyze the anatomical basis of historical vaginal operations for urinary stress incontinence (USI). *Materials and Methods:* Historical vaginal operations for cure of USI were critically analyzed as regards their modus operandi from an anatomical perspective using a 15 point system: 1. Minimal invasiveness. 2. Ease of performance. 3. Built-in safety of the procedure. 4. Short term complications. 5. Long term complications. 6. Applicability to obese patients and those with poor tissues. 7. Applicability to patients with previous operations for stress incontinence. 8. Blood loss. 9. Length of operation. 10. Early discharge from hospital. 11. Urinary retention. 12. Long-term continence. 13. Early resumption of normal activities. 14. Anatomical damage. 15. Physiological mode of action of the operation. *Results:* A critical analysis is given for each type of vaginal repair. *Discussion and Conclusions:* some surgeons, for example Ingelman-Sundberg believed that there was a very firm place for vaginal repair operation. Others such as Tanagho categorically stated that there was no place for vaginal repair, believing that a bladder neck elevation operation should be performed as a first choice operation.

Key words: Urinary Stress Incontinence (USI); Vaginal Operation; Anatomical Perspectives.

INTRODUCTION

As there have been at least 100 operations, Ingelman-Sundberg,[1] described for the cure of stress incontinence, it is reasonable to conclude that no one operation fully addresses the problems and complications associated with surgical cure of this condition. In the following sections, an analysis is made of the existing operations, as well as an assessment of their strengths and weaknesses. From this analysis, the main problems associated with existing operations are identified.

The three main categories of operation for stress incontinence are:

1 Vaginal Repair

2 Colposuspension

3 Sling

Evaluation of each category of operation with reference to a 15 point table is made. The most common variants of these operations are described. It will be assumed that the same limitations of the category (e.g. vaginal repair) apply to a greater or lesser extent also to the variations. Criticism will be based on logical analysis with reference to known anatomy, physiology etc, or on references in the literature. Important papers will be quoted in detail. An attempt will be made to evaluate each operation as to its modus operandi, referring specifically to the hypothesis. A loose fourth category of operation will be described for operations not fitting comfortably into the above classification, e.g. the Zacharin and Bailey operations.

Suggested criteria needing to be filled by the ideal operation:

1 Minimally Invasiveness.

2 Ease of Performance.

This allows the operation to be performed by less skilful surgeons. It also reduces the operating time and the potential complication rate.

3 Built-in Safety of the procedure.

In a methodological sense, the operation must have an inbuilt safety margin, if possible to avoid penetrating the various adjacent organs and to diagnose any perforations occurring. As part of this process, one should bear in mind the complicating presence of scar tissue from previous operations, and the fact that anatomical variations, especially of the ureters, not infrequently occur.

4 Short term complications.

There are complications associated with general anaesthesia, the presence of intercurrent disease (often a problem due to the high incidence of incontinence in the aged), thrombosis, haemorrhage, lung complications, and infection, especially as the operation is conducted in an area inhabited by the bladder, urethra, ureters and the blood vessels of the vesical plexus.

5 Long term complications.

Retention of urine is dealt with separately, but complications such as enterocoele formation and dyspareunia, pain at the site of artificial fibre insertion in the rectus sheath, herniation through the rectus sheath in, for example, Aldridge sling operations. Each operation has its specific complications. These complications will be attributed to the anatomical distortions associated with bladder neck elevation procedures.

6 Applicability to obese patients and those with poor tissues.

All suprapubic operations are difficult in obese patients, the open operations being particularly so. In the elderly patient, the diabetic, the obese with poor tissues where the integrity of the operation hangs on the suturing of tissue to either bone or ligament there is a risk of the suture tearing out of the tissue, usually the vagina.

7 Applicability to patients with previous operations for stress incontinence.

Previous operations tend to form fibrosis and even if the urethra is freed from the fibrotic tissue.

8 Blood loss.

There are very few reports in the literature which measure the amount of blood loss. The importance of blood loss relates to an accompanying increased incidence of thrombosis, infection, risks from transfusion and, of course, greater morbidity and increased length of stay in hospital. As an indication of the importance of this parameter, Stanton et al[2] recorded an average blood loss in the Burch operation of 377 ml, rising to an aggregate of 858ml with hysterectomy.

9 Length of operation.

This parameter partly impinges on 1), 2), 4), 6) and 8) above, and there is also wide variation here, depending on the patient and the surgeon. Certain operations, however, are inherently more complicated than others. For example, there is much more involved in an Aldridge sling or a Zacharin operation than there is in a Burch or Marshall-Marchetti operation.

10 Early discharge from hospital.

Over and above the economic factor of saving the cost of hospital days, an operation which allows early discharge almost certainly is a far more efficient, less traumatic and more desirable operation.

11 Urinary Retention.

"The most vexing problem has been incomplete voiding", referring to the complications of retropubic urethropexy. This needs to be stated as a specific complication. It is very discomforting to the patient, adds considerably to the cost of the operation and greatly predisposes to urinary tract infection.

12 Long-term Continence.

All operations have an increasing failure rate with time Very few series have properly defined objective criteria for assessment of post-operative results,[4] Thus this parameter has to be carefully examined. Many operations have very good short term results which, unfortunately, are not borne out when the patient is reassessed after two years.

13 Early resumption of normal activities such as housework, intercourse, sport. The operation can be painful and may require up to two weeks lying in bed with an indwelling catheter.

These are some of the most serious obstacles to young women with families undertaking a vaginal repair operation.

14 Anatomical damage.

It is important to avoid any damage which could hinder a successive operation should the primary operation fail. Specifically, fibrosis to the urethra and bladder neck must be avoided in the methodology of all operations.[5] This, of course, is not always possible, but certain operations do appear to be less likely to cause this problem, especially if large segments of vagina are excised.

15 Physiological mode of action of the operation.

The central criterion here will be whether there is anatomical distortion following operation, on the traditional basis that function follows restoration of normal anatomy.

Tanagho[5] discusses the importance of anatomical restoration as a prerequisite to restoration of function.

VAGINAL OPERATIONS

The early operations

Essentially, the vaginal repair consists of excision of vaginal tissue, and resuturing of the cut edges, thus tightening the suburethral vagina. This operation dates back to Schulte[6] in 1870. Kelly[7] in 1914 gave a report on 20 cases, 85% of whom had borne children. In a short literature review, he described two types of operative management:

1 Creation of an artificial channel

2 Operations which restored the urethra with the normal power of retention.

The first group were essentially diversionary operations, by creation of vesico-abdominal or rectovaginal fistulae. In the second group he described simple compression of the urethra by anterior colporrophy, or by the periurethral injection with paraffin. Kelly[7] described the following: an operation by Schultze,[8] whereby the lumen of the urethra and the vesical neck were narrowed by excision of vaginal skin 3cm x 1cm broad; Frank[9] excised a wedge-shaped piece from the posterior urethral wall, including vaginal and urethral mucosa; Wenkel & Engstrom[9] described similar procedures; Desnos[9] dissected the vaginal mucosa and placed a large catgut suture 2mm to 3mm from the neck of the bladder and tied it tightly over a catheter. He describes altering the external meatus below the clitoris by Pousson, Albarran and Dudley.[7] These procedures apparently did provide relief of the incontinence. The various operations in both groups are comprehensively listed by Ingelman-Sundberg.[9]

The Kelly operation[7]

Using a Pezzer catheter, the stem not over 5mm in diameter, introduced into the bladder, an incision is made in the vaginal wall down to the urethra and the bladder on the median line for about 3.5cm to 5 cm. The neck of the bladder should be at the centre of the incision. The vagina is detached on both sides for a distance of 2cm to 2.5cm. Using fine silk or linen 1.5cm of tissue is taken on either side of the bladder neck and approximated at the midline. A second suture is made in this fashion and then the catheter removed. Following this, excess vaginal skin is excised and the edges approximated. Kelly described four cases in which the operation was not successful. All were multiparae and three had previous operations on the vagina. He felt that prognosis was exceedingly unfavourable in all because of the presence of dense scar tissue in the vaginal vault and at the site of the vesical sphincter. Post-operatively, he felt the patients should not be catheterized unless it is imperative, although sometimes it must be done for several days or even for a week. Barnett,[10] summarized the modern application of the Kelly operation with specific reference to the formation of the urethrovesical angle.

Kennedy,[11,12] modification of the Kelly operation.

The urethra is widely separated from the pubic rami, thoroughly mobilized at the urethrovesical junction, adhesions lysed, and the urethra and bladder neck plicated by a series of interrupted mattress sutures. Approximation of the pubococcygeus muscles may or may not be performed.

Modified Kelly procedure

Strengthening pubourethral ligaments vaginally.

There are many variants of this operation Nichols & Milley,[13] identified the pubourethral ligaments in a transvaginal surgical approach. Warrell[14] uses the suburethral fascia and approximates it. Kralj (personal communication 1992) & Lohadny (personal communication 1992) use a technique which involves the identification of the puborurethral ligament and their plication in the mid-line vaginally. Retropubic vaginal urethropexy for the treatment of genuine stress incontinence with prolapse: Inglesi et al (1992), reported a new procedure which involves the creation of two central longitudinal flaps extending downwards from the urethra as follows:

Taking a 4cm incision downwards from the external urethral meatus, a flap is created 3cm wide, which is ultimately divided into two strips 1.5cm wide x 4cm long, these flaps are then stitched into the periosteum of the lower portion of the pubis about 3cm to each side of the mid-line. Standard vaginal repair is then performed. Follow-up of 41 patients was between 1 and 5 years and 95.1% were cured. One patient had urinary retention, 1 urinary infection, 3 had vaginal bleeding and 1 haematuria. Most patients voided between the 4th and 6th post-operative day. It is claimed that this technique elevates and supports the urethrovesical junction.

Injectable type operations

Kelly (1914)[7] described the periurethral injection of paraffin. Horn's Operation[15] (1975), artificially provides an elevation at the UVJ via the vaginal route by implantation of a fibrin "bean" which ultimately fibroses, creating scar tissue in this area.

Gax-Collagen injection: Appell et al[16] in 1989 injected up to 14mls Gax-collagen (glutaraldehyde cross- linked collagen) either peri or transurethrally. Review up to 12 months later gave 80.8% success rate in females. Urodynamically, the leak point pressure rose an average of 34cm in patients rendered continent. It is claimed that the bovine collagen is replaced by endogenously produced collagen. This is a variation of the Teflon injection technique by Politano[17] in 1982, and the periurethral injection of paraffin described by Kelly (1914). Collagen injection, Eckford,[18] demonstrated that of 15 patients without previous surgery, 9 patients were completely continent, three patients improved and 3 failed. Of 20 with previous surgery, 15 were completely continent, 2 improved, 3 failed. Patients were reviewed at six months. In another study, Stricker[19] demonstrated that of 17 female patients, each with an average of 3.2 operations and Type III incontinence were treated, objectively tested with 200mls in the bladder. Eleven of the 17 were dry, 3 improved, average number of rejection was 2 over a two and a half month period.

Comment on injectables

Peacock[20] states that interspecies homology of collagens from the same tissue may be 85% to 95%. The difference may involve simply one amino acid base pair in the DNA molecule. Despite the increased cross-linking from glutaraldehyde, the antigenic nature of the collagen does not alter. The question of collagen formation to foreign bodies is thoroughly examined elsewhere in this thesis. The question is, does the antigenically different collagen behave as a foreign body, much as a carageenan granuloma does,[21] i.e., is it ultimately completely removed by macrophages? At 150 days, the granuloma induced by the carrageenan was minimal in size.[21] Histologically, there were large clusters of fat cells interspersed with thick bundles of collagen and macrophages. Nevertheless, the induced fibrous tissue is also ultimately absorbed. If the above holds, then it may be predicted that Gax-collagen injections would fail over a period of say 2-3 years. The injection of Teflon[17] is a different matter, however. The Teflon would act as a plastic sponge, so that the fibrous tissue reaction induced would at least theoretically be permanent. It has been found that such Teflon injections are ultimately broken down and scattered away from the original site.

Repair of vaginal fascial defects

Baden and Walker[22] described various defective anatomical fascial supports as causing Stress Incontinence (SI). These were first described by White and include:

(1) Midline (pre and post cervical defects).

(2) Lateral (paravaginal) defects.

(3) Supravaginal, (uterosacral and lateral cervical) defects.

Vaginal route repair of (1) and (2) gave 60% and 77% cure rates respectively, while the abdominal aproach gave 83% and 87% cure rates. Repair of (3) by either route gave 80% cure rates. Diagnosis involved a complicated scaling classification from 1-4 involving urethrocoele, cystocoele, cervical prolapse, enterocoele, rectocoele and perineal laceration. This grading is, by the authors' own admission, highly subjective. Richardson[23] used a similar approach to Baden in cure of SI, but mainly used the suprapubic approach.

Ingelman-Sundberg operation[24]

Essentially, this is a Kelly type repair combined with sectioning the pubococcygeus muscles vaginally in the middle, suturing the anterior halves suburethrally, and joining the posterior halves to the ischiocavernosus muscles.

Indications: All types of SI, especially in obese patients and operative failures, whether suprapubic or vaginal.

Urethrocleisis

Frewen[25] narrowed the urethra combined with a free urethral graft taken from the external oblique aponeurosis. Subsequently Payne (1983) omitted the graft and simply performed the urethrocleisis using nonabsorbable sutures. He reported satisfactory results from 60/62 patients.

General Comments

Kelly's classical description outlines the cardinal principles of vaginal operations for stress incontinence. All other vaginal operations are essentially variations of the Kelly procedure. The Kennedy and other modifications actively recreate the urethrovesical angle, especially if, as recommended by Martius[26] and Kennedy (1937, 1941) himself, the pubococcygeus muscles are approximated in the midline below bladder base. The sutures, however, tend to tear out with this modification. Alternatively, the muscles become atrophied (Obrink).[27] The Ingelman-Sundberg operation retains the nerve and blood supply of the pubococcygeus muscle. Severing it and reanastomosing it ensures that there is no pressure necrosis or atrophy. A 30% fall in urethral pressure has been reported (Bunne).[28] Technically, however, this operation is difficult, as the pubococcygeus muscles need to be sufficiently mobilized so as to be able to be approximated. Postoperative retention and pain were a problem. Though the results as published by others were equivalent to colposuspension, this operation was performed by very few surgeons.

Within the scope offered by the surgical principles of the Kelly operation, various points of surgical detail appear to influence the results. Barnett (1969)[10] pointed out the importance of primarily building up the tissue below the urethrovesical junction (UVJ) with the available tissue prior to suturing the urethra from either end.

Other techniques of ensuring that the bladder neck is plicated include that of Reynolds,[29] who inserted sutures into the periosteum on either side of the urethra vaginally. The exact position of the bladder neck needs to be properly defined if the UVJ is to be accurately plicated.

Barnett[30] suggested pulling down the balloon of the Foley catheter. This method may be inaccurate if the proximal urethra is dilated (funnelling). The use of non-absorbable sutures appears to give a significantly higher success rate, 65% vs 46%, but is associated with sinus formation (Cullen).[31] Baden's work specifies different anatomical defects in the fascial supports. He proceeds to specifically correct these. The Kelly repair (Kennedy variant) would automatically repair the midline and paravaginal defects of Baden, but would not correct the cervical or uterosacral defects. Baden gives no rationale whatsoever for the success of his operation. He simply states that these are defects of pelvic fascia.

The Reynolds technique seems in some ways preceded the midurethral sling concept, though the initial results, 65% indicate that the attachment of urethra to the symphysis may not have been at the correct midurethral point.

As regards the Frewin urethrocleisis operation, given the inverse exponential relationship between urethral diameter and urine flow, this operation can only work by causing obstruction and therefore a poor stream. Lack of uptake of such a simple operation indicates it was not effective in the longer term.

Site specific repair (Baden Walker) is attractive as regards cure of cystocele and rectocele, but it cannot restore the suspensory ligaments, in this case, the pubourethral ligament.

Evaluation of vaginal repair operations according to the 15 criteria:

(1) Invasiveness.
The operation is invasive and may cause not only loss of tissue through excision but tissue damage, adhesions at bladder neck and blood loss, if the infravesical plexus is disturbed. There is less tissue damage and less blood loss with a vaginal repair vis a vis a Burch Colposuspension.

(2) Ease of performance
The operation is easily performed but it requires considerable judgment, especially in the plastic reconstruction of the vagina. Excessive tissue removal may lead to dyspareunia or even apareunia.

(3) Built-in safety
This procedure is a function entirely of surgical skill. If the dissection is taken too far laterally, the infravesical plexus of veins may be injured. Atrophic tissues need to be handled with care. A smaller calibre of suture needs to be used in these instances. Opening into the correct plane is vital to avoid bladder or urethral perforations. Insertion of sutures into the bladder wall at the UVJ may inadvertently obstruct ureter(s).

(4) Short term complications
It is subject to all those listed above. Major complications can occur, such as perforation of the bladder, urethra, and fistulae due to avascularity and blood loss.

(5) Long term complications
Can include dyspareunia from excessive tissue resection, and worsening of the incontinence with excessive scar formation, Hodgkinson.[32] Post-operative urgency and frequency has been reported, Lee.[33]

(6) Applicability to obese patients
The operation is easily performed with obese patients, or in those with poor tissues, but there is a much greater chance of failure due to the greater intra-abdominal pressure generated. The integrity of the operation depends on the integrity of the suture line, especially in poor or atrophic tissues. This can be torn or stretched very easily upon application of intra-abdominal pressure. A strong involuntary cough or sneeze, can easily approach 2.2 lbs/sq in., Petros (1987-90, unpublished data). The pressure needed, to tear a suture out of smooth muscle, the principal supporting layer of the vagina, Goff.[34] 1931, is approximately 2.8lbs/sq inch, Van Winkle.[35] The margin between sutures tearing out, and supporting the suture line for a sufficient period (usually 4-6 weeks) for healing to take place is therefore minimal.

(7) A previously failed procedure
Ingleman-Sundberg stated that this is a contra-indication to the Kelly procedure, and the Ingelman-Sundberg muscle transplant operation should be performed in this instance.[36] The consensus, however, was that an abdominal procedure such as the Burch Colposuspension was indicated.

(8) Blood loss
This only becomes a problem when the wrong plane is entered, or if the surgeon does not immediately institute haemostasis. Haematoma formation is the main post-operative complication (Warrell).[37]

(9) Length of Operation
There is wide variation, depending on the surgeon and his technique. Blood loss can be considerable in a vaginal repair operation, especially if the bladder is dissected away from the vagina and the perivesical plexus is damaged. This bleeding can add considerably to the length of the operation, which is rarely under 30 minutes.

(10) Early Discharge
Generally the patient needs to stay at least 7 days in hospital but often the stay can be much longer, especially if the vaginal repair has been made fairly tightly and the patient is unable to void sometimes for weeks afterwards.

(11) Retention of urine
Because the vaginal repair is carried right to the bladder neck, this creates a tightness which prevents the urethral funneling so essential to reduction of intraurethral resistance (Law of Poiseuille). This may become a problem for many weeks, in patients who have a very tight repair. It is fortunate that the vagina being the elastic organ that it is, urinary function generally returns to normal even in situations where there has been retention for several weeks post-operatively.

(12) Initial success rate
This may be as high as 85% (Jones).[38] Ten year success rates for the Kennedy Operation may be up to 64%, and for the Kelly, 50% (Cullen).[31] Recurrence of the urinary incontinence may be up to 50% of patients in the longer term (2 years), according to Green,[39] or nearly 60% (Ingelman-Sundberg).[36] With muscle transplant (Ingelman-Sundberg Operation) (1952), the success rate may be as high as 94% at 2-5 years, or 84% at 10-20 years, Da Silviera & Piccoli.[40] Quigley,[41] in a review article reported rates between 48% and 63%. Warrell (six month cure rate between 80% and 90%). Bergman et al[42] failure rates for

anterior colporrhaphy was 31%. No attempt will be made to explain the different cure rates other than:

(a) There may be different population samples.
(b) Differences in surgical skill and technique.
(c) Varied/optimistic/imprecise assessment methods.

Perhaps the key factor in longer term failure is the inability of vaginal repairs to reconstitute the pubourethral ligament.

(13) Return to normal activities

The tendency to recurrence (cf. 12, above) imposes an obligation on the surgeon to emphasise to the patient that she must abstain from any stressful activity for at least 6-12 weeks after the operation, the time taken for the scar tissue to strengthen.

(14) Anatomical damage

The vagina and urethral wall is often a problem due to scarring. The particular type of complication depends on the site of the adhesions. In the area of the bladder neck it can cause sometimes quite severe symptoms of frequency, urgency and nocturia (Green).[39] The occurrence of urinary incontinence after cystocoele repair is a well-known phenomenon (Hodgkinson).[32] Fixation of the vagina to the urethra by scar tissue formation may not only prevent the normal physiological workings of the urinary continence mechanism, it may impede or even prevent suprapubic operation to cure the incontinence following failed vaginal surgery. Tightening and narrowing the urethra may cause increased intraluminal resistance according to Poiseuille's Law, resulting in poor urinary flow, as in the Frewen operation.

(15) Mode of action

Other than scarring, the vaginal repair, precisely performed so that there is not excessive tightening of the suburethral vagina or narrowing of the urethra, is certainly physiological, as there is no distortion as such of the pelvic floor anatomy. Ingelman-Sundberg operation is specifically excluded from this comment, as it potentially alters the function of the pubococcygeus muscles.

It is difficult to ascribe success of vaginal repair to bladder neck elevation when demonstrably there can be minimal elevation of bladder neck with a vaginal repair. Nevertheless, there are certain common features that need to be correlated.

(1) The suburethral vagina is tightened.

(2) The modus operandi of Teflon paste, or Gax-collagen injections.

(3) Ingelman-Sundberg's higher rate of cure with muscle transposition.

The latter implies that this maneouvre must restore an additional anatomical, and therefore functional, parameter. The increased closure pressure reported by the Gax-collagen injection similarly can not be explained by improved transmission of pressure. In any case, this increase in pressure may not be permanent. In patients having a vaginal repair, Obrink[27] noted initial increase in maximal urethral pressure immediately post-operatively, returning to pre-operative levels within 3 months. The implication of this is that vaginal repairs work by obstructing the flow as per Poisueille's Law, and fail as the tissues dilate in time.

The modus operandi of the Ingelman-Sundberg operation may be that the transposition tensions the pubourethral ligament, thereby restoring it as the fulcrum point for musculoelastic closure.[40]

CONCLUSIONS

The suitability of vaginal repair as a primary procedure was a controversial topic even historically. Ingelman-Sundberg and Ulmsten believed that there was a very firm place for vaginal repair operation. Green performed a vaginal repair as the operation of first choice if radiologically the urethra was inclined at less than 45 degrees to the vertical axes Stanton,[43] who introduced the Burch colposuspension to the UK nevertheless did not commit himself definitively, but implies that a bladder neck elevation procedure has a much higher success rate, 84% as against 36%. Tanagho[44] who's modification of the Burch operation led to its dominance, categorically statedthat there is no place for vaginal repair and relates worsening of urological symptoms to this procedure. He believes that a bladder neck elevation operation should be performed ab initio. The passage of some years seems to have confirmed Tanagho's view.

Conflicts of interest: none.

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Review

Review of pelvic floor disorders rehabilitation: the impact of rehabilitative treatment on obstructed defecation and faecal incontinence

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Abstract: The aim of this review is to evaluate the impact of rehabilitative treatment in patients with obstructed defecation or fecal incontinence. Pelvic floor muscle training, biofeedback therapy, anal electrostimulation and volumetric rehabilitation have been used to treat the symptoms of patients with the above disorders. Because there are no international agreements on the use of these various rehabilitative techniques, the main problem is related to the absence of standards and guidelines. In spite of these drawbacks many patients may be cured and their quality of life improves. Rehabilitative treatment can also identify those ''non-responders'' who should be next in line for more expensive and invasive therapeutic procedures.

Key words: Obstructed defecation; Fecal incontinence; Biofeedback; Pelvic floor disorder; Pelvic floor disorder rehabilitation.

INTRODUCTION

Rehabilitative treatment (RT) is the first-line therapy of obstructed defecation and fecal incontinence in patients who have not responded to simple dietary programs or medication.[1,2] Once the rehabilitative option has been selected, the problem arises as to implement it. Since there are no international agreements on the use of the various rehabilitative techniques, the main problems are related to an absence of standards and guidelines. There are no universally accepted recommendations or enough evidence about how to perform rehabilitative treatment, nor are there specific criteria for evaluating eventual interventions.[3] RT requires a highly trained therapist and is time consuming both for the therapist and the patient. Patients must therefore be strongly motivated. In spite of these negative factors, RT has a success rate of about 70% and the patient's quality of life is significantly better than that before treatment.[4,5] Last but not least, even if RT fails, it will not have a deleterious effect on the patient's condition, and its results will not affect future decisions regarding therapy, including surgery.[6,7] Nevertheless, significant anatomical damage, severe psychiatric or neurological disease, poor patient compliance, and poor patient-physiotherapist interactions can pose major obstacles to the success of RT.[8,9]

The aim of this review is to characterize functional and clinical results of pelvic floor disorder rehabilitation. After a short description of rehabilitative techniques, the RT of obstructed defecation and fecal incontinence will be described and clinical impacts of treatment will be clarified.

REHABILITATIVE TECHNIQUES

As outlined above there is no unanimous consensus on how to implement rehabilitative techniques: the working system, exercise variety, daily or weekly rhythm, and equipping tools all differ in various clinics dedicated to pelvic floor rehabilitation. Universally standardized protocols are absent and there is thus great confusion about how to successfully carry out a rehabilitation cycle. Nevertheless, there are some cornerstones of RT in patients affected by obstructed defecation or fecal incontinence: each rehabilitative technique is aimed at a specific anatomophysiological target and therefore should be used only when the related continence stool mechanism could be impaired.

Pelvic floor rehabilitation involves biofeedback (BF), pelviperineal kinesitherapy (PK), volumetric rehabilitation (VR) and electrostimulation (ES).

Biofeedback

Biofeedback is a conditioning method for the defecation reflex, which consists of pelvic floor coordination exercises together with visual / verbal feedback training. It is voluntary, employs a trial-and-error process whereby learning takes place and the subject must be aware of the desired response (signals). Biofeedback training is aimed at improving voluntary external anal sphincter contraction and relaxation.[10,11] Another effect is training of synchrony for internal and external sphincter responses during rectal distension.[12] Biofeedback may make use of electromyographic or pressure devices in the office using a working station, or at home by means of portable electronics. The therapist instructs the patient in how to improve anal contraction and/or anal relaxation in order to retrain the external anal sphincter and puborectalis muscle to coordinate defecation and permit emergency continence.

Pelviperineal kinesitherapy

Pelviperineal kinesitherapy is a type of muscular training that is selectively aimed at the levator ani muscles to improve performance, extension, and elasticity. It is mainly used in patients with obstructed defecation who have pelvic floor dyssynergia, because it is a specific muscular re-education technique for the uncoordinated pelvic floor muscles. It is also used in patients with fecal incontinence and descending perineum syndrome[13] or defects of the pelvic floor.[14] The aim of this therapy in this setting is to teach the patient about the correct sequence of contraction and relaxation of the striated muscles that is required for defecation. Usually a cycle of pelviperineal kinesitherapy follows a sequence of exercises performed weekly in outpatient sessions, individualized for each patient.[15,16] The variety and sequence of pelviperineal exercise are not standardized and each clinic dedicated to pelvic floor rehabilitation has its own treatment protocol. This implies that it is not possible to compare functional and clinical outcomes of kinesitherapeutic treatments.

Volumetric rehabilitation

Volumetric rehabilitation (sensory retraining) is indicated for disordered rectal sensation and/or impaired rectal com-

pliance. The aim is to increase the patient's ability to perceive the rectal distension induced by faeces or flatus ("rectal sensation") and to improve the elastic properties of the rectal wall. Such RT may be performed through biofeedback ("sensory retraining")[17] or volumetric rehabilitation using an inflated balloon[18] or water enemas of decreasing/increasing volume.[14] Volumetric rehabilitation involves twice-daily administration of a tepid water enema.

If the patient's conscious rectal resting threshold is high, the initial volume is equal to the maximally tolerated manometric volume. The patient holds the liquid for 1 minute. In the following days, the enema volume (20 ml) is gradually decreased until the patient achieves a normal value of rectal sensation. On the contrary, in the presence of impaired rectal sensation with the lowest rectal sensations, the aim of volumetric rehabilitation is to restore a conscious rectal sensitivity threshold to near normal volume. The sequential order involves the step by step use of enemas with increasing cubic units (20 ml) until the patient has again achieved normal rectal sensations.

Anal electrostimulation

The purpose of anal electrical stimulation is to induce muscle contraction by direct stimulation or indirectly via peripheral nerve stimulation. A Cochrane Library review on electrical stimulation for fecal incontinence concludes that there is not sufficient evidence on which to judge the effectiveness of electrical stimulation in the management of patients with fecal incontinence, nor is there enough evidence on which to select patients suitable for this type of treatment, nor to know which modality of electrical stimulation is optimal.[19] The rehabilitative cycle is performed daily for several months by the patient in a home environment. The device delivers a square wave of current alternating between a work period of a few seconds and a double rest period, according to a standard sequence of pulse (width in milliseconds; frequency in herz). This rehabilitative technique does not have any universally accepted protocol.

OBSTRUCTED DEFECATION

Obstructed defecation is broadly defined as a patient's inability to evacuate contents from the rectum[1] with symptoms of dyschezia and a subjective sensation of anal blockage during defecation. Outlet obstruction may be caused by organic or functional diseases, and only diagnostic instruments can identify the causes. Mechanical causes include rectocele, rectoanal intussusception, descending perineum syndrome, solitary rectal ulcer syndrome, mucosal rectal prolapse, enterocele and sigmoidocele. Disorders of rectal sensation and pelvic floor dyssynergia are the functional diseases.[20] In clinical practice, after failure of conservative therapy with high-fibre diet and laxatives, rehabilitation is the first therapeutic option for obstructed defaecation.[1,21] There is not universally accepted rehabilitative protocol so each centre adopts its own rehabilitation modalities. However, all RT programs aim to improve defecation-related behaviour and restore a normal pattern of defaecation through the use of both instruments and educational devices. Biofeedback is the treatment of choice for patients affected by pelvic floor dyssynergia. Three randomized controlled trials[22,23,24] have shown a success rate of approximately 70% and a long-term success rate of approximately 50%.[24] In order to improve the outcomes of RT, pelviperineal kinesitherapy may be added to biofeedback: active training of the levator ani and perineal muscles makes the work of biofeedback easier because only these muscles are recruited for pelvic floor relaxation during defaecation.[15,16] The success rate increases to about 90%,[5] with subsequent improvements in the patient's quality of life occurring. RT is also an effective therapy for organic diseases.[1,20] A multimodal rehabilitation programme, employing the four rehabilitative techniques guided by anorectal manometry, may be used.[5] The overall mean Obstructed Defecation Syndrome score[25] has been shown to significantly improve after treatment. Patients with rectoanal intussusception have the worst score, even if it was significantly better than before rehabilitation.[5] Although it is difficult to discriminate between patients with organic diseases who will derive some benefit from RT and those who instead will require surgery, the generally accepted procedure is to begin with RT and, if this proves ineffective, to then consider surgery.[26] One of the prerequisites for surgery to correct obstructed defaecation in patients with a rectocele and/or ano-rectal intussusception is the failure to respond to RT.[26] There are no clear guidelines to help the clinician to decide between the approaches of "rehabilitation-surgery" and "rehabilitation-surgery-rehabilitation". RT should certainly be prescribed if the outcome of anorectal surgery is unsatisfactory.[27]

RT may be useful for improving rectal sensation when anorectal manovolumetry demonstrates rectal hyposensitivity in patients with obstructed defecation.[28] Volumetric rehabilitation or sensory retraining restores a normal perception of faecal bolus: it is essential to triggering and maintaining defaecation.[5] After sensory conditioning, the threshold for rectal sensation improves in about 92% of patients and is similar to that observed in normal individuals.[29]

There is no general agreement as to which factors may predict or influence the outcome of RT. Significant anatomical damage, severe psychiatric or neurological disease, poor patient compliance, and poor patient-physiotherapist relationship can be major obstacles to the success of RT.[30,31]

Finally, the effects of RT are long-term: lasting improvement has been observed in patients with obstructed defecation (confirmed clinically and by manometry) for up to 2 years after RT.[22,32,33]

FECAL INCONTINENCE

Faecal incontinence means involuntary loss of liquid or solid stool, occurring for > 3 months.[34] It may be idiopathic or secondary to organic diseases such as rectal prolapse, post-partum incontinence, post-surgical incontinence (including after sphincter-saving surgery), descending perineum syndrome, rectocele, rectoanal intussusception, diabetes, neurological and orthopaedic diseases. There is not universally accepted therapeutic algorithm but usually RT is considered the first-line option in treating fecal incontinence in patients who have not responded to simple dietary changes or medication.[35,36]

Functional fecal incontinence[37] is an indication for RT with uncontrolled studies reporting improved continence in 70% of patients with faecal incontinence after biofeedback therapy.[4] A similar percentage is reported for RT when used in fecal incontinence secondary to organic diseases.[14] In clinical practice there are no universally accepted recommendations or enough evidence about how to perform RT, nor are there specific criteria for evaluating the efficacy of this intervention.[3] This implies that outcomes often vary from one centre to another, so it is virtually impossible to predict the effects of RT. Finally, there are not suitable trials on drug treatment versus any other conservative treatments including RT, and so it is not possible to state if RT is more effective than drug therapy for the treatment of fe-

cal incontinence. Similarly there are no studies on the utility of carrying out RT in patients prior to surgery. However, experience suggests that RT, even if it does not achieve satisfactory function, can improve continence mechanisms and can therefore contribute to a positive outcome in elective anal sphincter repair. Vice versa, RT after surgery may help operated patients to achieve acceptable continence with symptomatic improvement.[38,39]

The pathophysiology of fecal incontinence is often multifactorial and this fundamental aspect should influence whatever treatment may be proposed. Each patient has his/her own specific pathogenic profile as a result of a mix of aetiological factors: for example, 48% of patients with anal sphincter lesions may have impaired rectal sensation.[40] Each patient thus requires a clinical approach that must be modulated according to his or her specific aetiology. This basic fact must be considered when planning therapy for a patient with fecal incontinence and thus rehabilitative treatment should adhere to this statement. Different training programs must be used for different patients and distinct rehabilitation techniques should be employed only when indicated by related diagnostic reports. The model of multimodal rehabilitation, performed under the guidance of anorectal manometry, may be a useful option for treating fecal incontinence.[14]

Biofeedback is the main technique that should be used: it is superior to pelvic floor exercises,[36] but when biofeedback is combined with anal electrostimulation the results are better than biofeedback alone.[41] Eighteen randomized trials support the use of biofeedback in fecal incontinence.[3] Negative predictive factors are sphincter lesions > 120°, previous hysterectomy, a Fecal Incontinence Severity Index score >13, adjuvant and/or neoadjuvant radiotherapy for rectal cancer.[40,42] Positive prognostic factors are age < 50 years, Wexner Incontinence score < 10, anal resting pressure > 50 mmHg, and a maximal voluntary contraction > 80 mmHg.[43]

RT improves continence in many patients and some of them can become symptom free. Improvement in fecal urgency and in the subjective rating of bowel control is also long-lasting: in one randomized study, at the 2-year follow-up, shows that improvement is maintained in incontinent patients who had undergone biofeedback, also with different exercise regimens.[44]

CONCLUSION

In conclusion, rehabilitative treatment of faecal incontinence, when globally considered, is a good therapeutic option. It offers useful insight by identifying those ‘‘non-responder patients’’ who should be next in line for more expensive and invasive therapeutic procedures (sacral neuromodulation, surgery).

Conflict of Interest Statement. The Author declares that there is no conflict of interest.

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Translational medicine (N.d.R., from Wikipedia)

Translational medicine (also referred to as translational science) is a discipline within biomedical and public health research that aims to improve the health of individuals and the community by "translating" findings into diagnostic tools, medicines, procedures, policies and education.

Translational medicine is a rapidly growing discipline in biomedical research and aims to expedite the discovery of new diagnostic tools and treatments by using a multi-disciplinary, highly collaborative, "bench-to-bedside" approach. Within public health, translational medicine is focused on ensuring that proven strategies for disease treatment and prevention are actually implemented within the community. One prevalent description of translational medicine, first introduced by the Institute of Medicine's Clinical Research Roundtable, highlights two roadblocks (i.e., distinct areas in need of improvement): the first translational block (T1) prevents basic research findings from being tested in a clinical setting; the second translational block (T2) prevents proven interventions from becoming standard practice.

The National Institutes of Health (NIH) has made a major push to fund translational medicine, especially within biomedical research, with a focus on cross-functional collaborations (e.g., between researchers and clinicians); leveraging new technology and data analysis tools, and increasing the speed at which new treatments reach patients. In December 2011, The National Center for Advancing Translational Science (NCATS) was established within the NIH to "transform the translational science process so that new treatments and cures for disease can be delivered to patients faster." The Clinical and Translational Science Awards, established in 2006 and now funded by NCATS, supports 60 centers across the country that provide "academic homes for translational sciences and supporting research resources needed by local and national research communities." According to an article published in 2006 in Science Career Magazine, the European Commission is targeting a majority of its 6 Billion budget to further translational medicine.

Original article

Long term follow up of the transobturator tape procedure for the treatment of stress urinary incontinence in a tertiary institution in South Africa

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Abstract: The transobturator tape (TOT) procedure has become the preferred procedure in managing female stress urinary incontinence (SUI) as it is safer than the tension-free vaginal tape (TVT) which was the "gold standard" since 1995. Ours is the first study looking at the continence status eight years after TOT surgery. The objectives of this series were to describe the long-term effectiveness over a maximum period of 8 years and to describe the associated complications. Records of patients of attending the urogynaecology unit at the tertiary Charlotte Maxeke Johannesburg Academic Hospital who underwent the TOT procedure from April 2005 to April 2010 were included. The study population included women who complained of stress urinary incontinence (SUI) and were diagnosed objectively in keeping with the definition by the International Continence Society (ICS). Follow-up was as per the clinic protocol. One-hundred and twenty women had a TOT procedure. The median age of the women in the group was 55.3 years. One case of bladder injury and 2 cases of vaginal perforation occurred intraoperatively. During the follow-up period 1 woman presented with tape erosion, 7 with sling failure, and 2 patients had de-novo detrusor instability. This descriptive study demonstrates a low intra-operative complication rate, a high subjective and objective cure rate and a low risk of complications up to 8 years (median 5 years and 8 months) of follow-up. We therefore recommend this procedure for the management of genuine SUI in women. We believe that the time has arrived for a new "gold standard".

Key words: Stress urinary incontinence; Transobturator tape; Tension-free transvaginal tape; Urodynamic studies.

INTRODUCTION

Stress urinary incontinence (SUI) is defined as the involuntary leakage of urine on effort, exertion or coughing without a rise in detrusor pressure.[1] It is a physiologically, emotionally and physically devastating condition and can adversely affect a woman's quality of life. SUI is estimated to affect up to one-third of women older than 18 years of age with a median age of 45 years.[2] In 2001, Delorme described the Trans-Obturator Tape (TOT)[3] as a mid-urethral sling for the surgical treatment of SUI. This minimally invasive procedure, termed "outside-in," in which the tape is inserted underneath the middle of the urethra between the two obturator foramina, has almost replaced the Tension-free Vaginal Tape (TVT) which was introduce by Ulmsten in 1995,[4] as it is safer due to the minimal risk of entry into the retro-pubic space.[3] The TOT has a low risk of bladder injuries, vascular injuries and post-operative voiding difficulties[5, 6, 7] as compared to the TVT.

Although cystoscopy is mandatory with a TVT, it is not always recommended for the TOT technique.[8, 9]

The TOT approach has been found to have high success rates with an objective and subjective cure rate of 90% and 97% respectively.[9, 10]

The objectives of this case series were to assess the durability and the long-term effectiveness of the procedure over a period of up to eight years of follow-up, and to describe the complications associated with the TOT procedure; and their management.

MATERIALS AND METHODS

The study was conducted at a tertiary urogynaecology unit in Johannesburg, South Africa, with the approval of the Human Research Ethics Committee of the University of the Witwatersrand. All women who underwent a TOT procedure in the unit from April 2005 to April 2010 were included in the study. Study participants were women with SUI. The diagnosis of SUI was based on subjective complains of involuntary leakage of urine on effort, sneezing or coughing without symptoms, suggesting an overactive bladder (as recommended by ICS).[1]

Objective bedside investigations included a cough test (performed in the lithotomy or standing position with a comfortably filled bladder), residual volume and urine dipstick to exclude infection. Uro-dynamic studies (UDS) were not routinely performed in patients with pure SUI following a history, clinical and bedside investigations; but were mandatory for patients who presented with overactive bladder (OAB) symptoms.

The surgical technique was originally described by Delorme in 2001.[3]

Postoperative evaluations were scheduled for 1 week, 6 weeks, 6 months, 1 year and annually thereafter. Evaluations included a cough stress test, a vaginal examination and residual volume. If a patient presented with overactive bladder (OAB) symptoms during follow-up, UDS were performed.

A 24-hour pad test was not performed. Patients unable to present at the clinic were contacted telephonically to assess subjective cure. Patients were contacted by a qualified nurse working in the uro-gynaecology clinic and asked if symptoms were present, however the patients were not subjected to a formal questionnaire. All patients who reported dissatisfaction with the procedure or on-going symptoms were asked to return to the clinic for further assessment.

Patients were considered objectively cured if they did not demonstrate stress urinary incontinence during the stress provocation test (cough test) and were deemed not to have urinary retention if a residual volume of less 100 ml was recorded. Tape erosion and de-novo urinary incontinence were considered as failures.

Subjective success rates were measured as the patient's satisfaction with the procedure during follow-up. The definition of a cure of SUI was the disappearance of subjective and objective leakage.

Descriptive statistics were performed, showing the frequencies and percentages for categorical variables and the means, standard deviations and ranges for continuous variables.

RESULTS

One-hundred and twenty women underwent a transobturator tape procedure during the study period, of which 24 were associated with other surgical procedures. The follow-up period ranged between 36 to 96 months (3 years to 8 years). Patient characteristics, previous operations and concurrent operations during TOT procedures are summarized in Table 1. The mean patient age was 55.3 years. Pure stress urinary incontinence was found in 118 patients. Two patients with mixed urinary incontinence with predominant stress symptoms were included in this study.

TABLE 1. – Demographic and previous surgical characteristics of women in the study.

Age (years)	55.3 (range 31-84)
Parity	2.1 (range 1-6)
Previous operations:	
· Anterior repair	14
· Total abdominal hysterectomy	38
· Vaginal hysterectomy	12
· Posterior intravaginal slingoplasty	1

Concurrent operations during TOT procedures are presented in Table 2.

TABLE 2. – Concurrent operations performed during transobturator procedure.

Procedure	Number of patients
Posterior IVS	3
Vaginal hysterectomy	5
LAVH*	3
Anterior repair	2
Posterior repair	4
Laparoscopic sterilization	2
Removal of IUCD+	1
Removal of Labial cyst	1
Laparoscopy cystectomy	2
Fenton vulvoplasty	1

Five different types of slings were used during the study period and are shown in Table 3.

TABLE 3. – Transobturator mid-urethral slings used in the study.

Type of sling	Frequency of use
IVS-O (Tyco)	98 (81, 6%)
Aris (Mentor-Porges)	16 (13, 3%)
Monarc (AMS)	2 (1, 6%)
Obtryx (Boston Scientific)	2 (1, 6%)
Intramesh (Cousin)	2 (1, 6%)

All the operations were successfully completed. Intra-operative complications are presented in Table 4.

TABLE 4. – Intra-operative complications encountered during insertion of the transobturator tape.

Complication	Frequency
Bladder perforation	2 (1.6%)
Vaginal perforation	2 (1.6%)
Bleeding	0
Urethral perforation	0

Seven sling failures occurred. Four failures were diagnosed with positive cough test, 3 patients at six months and 1 at the one year follow up. During the follow up, three patients in addition to the four confirmed failures complained of subjective urinary leakage. The three patients were reinvestigated. Bed-side investigations failed to demonstrate leakage. In addition, vaginal examinations and residual volumes were normal. UDS performed on the 3 women also failed to demonstrate leakage. De novo detrusor instability was noted in two patients and was treated successfully with antimuscarinics. Sling erosion was diagnosed in one patient at the six months follow-up. Excision of the sling was performed, followed by local application of estrogen vaginal cream. All complications were diagnosed in the first year post-operatively. During the follow up period no other major complications were reported except for occasional cases of urinary tract infections, which were treated successfully with antibiotics.

TABLE 5. – Complications after insertion of transobturator tape between 36 to 96 months of follow-up.

Complication	Frequency
Tape erosion	1 (0.6%)
Sling failure	7 (5.8%)
De novo UI	2 (1.6%)

Follow-up data was censored at the end of April 2013 when the last patient who underwent TOT procedure completed 3 years of follow-up. At the last follow-up (range 36-96 months) 10 cases were considered as treatment failure (according to the definition of stress specific cure) with subjective cure rate of 90.4%. The objective cure rate was 93.3% as 3 patients failed to demonstrate urinary leakage on clinical examination (negative cough test with comfortable filled bladder) and no leakage of urine was noted during urodynamic studies.

DISCUSSION

The present study with a follow-up of more than five years is the longest known follow-up study conducted on the TOT surgical procedure for treatment of female stress urinary incontinence. Of the original 120 women, 104 (86.7%) were potentially available for follow-up. The percentage of those lost to follow-up was 13.3% which is fairly low for the study period covered.

Although it was not possible to assess the continence status of the 14 women lost to follow-up, we believe that the success rates we have obtained from the women evaluated is representative of the performance of the TOT procedure especially since all the complications occurred in the first year following the procedure.

Our results show that the TOT is an effective, safe procedure for treating SUI. The objective cure rate of SUI, defined as the disappearance of SUI, was 93.3% during the follow up period. Success rates are similar to other such reported series.[11, 12] There is a decreased risk of intra-operative complications with the TOT as compared to the TVT, particularly bladder perforation.[5,6,7] In our series, bladder perforation occurred in two patients (1.6%), and this is similar to other reported rates of 0 – 1.5%.[5,7,9,11] The two patients in this series with bladder perforations had had previous anterior repairs. Of significance is that the bladder perforations occurred during the dissections following vaginal incision and not during the insertion of the tape. Bladder injury during the insertion of the tunneler as seen in TVT should be distinguished from the bladder injuries during the creation of the para-urethral tunneler as seen in transobturator tape insertion.

The bladder repairs and two concomitant anterior repairs were performed in this study without cystoscopy. Instead catheterization with a methylene blue solution was performed demonstrating absence of leakage. Two vaginal perforations were diagnosed during the insertion of the tunnel-

er, corrected by repositioning and re-passing of the tunneler and the tape, without complications.

No major intraoperative complications such as bowel and vessel injuries were reported in our study, confirming the results of other studies that indicate the safety of this procedure. A recent report of the Austrian registry with data on 2.543 operations including 11 different tape systems, reported no bowel or major vessel injuries and low rates of intraoperative complications.[7]

There was minimal bleeding in our series as opposed to other published studies, which reported bleeding in excess of 200ml in 3.3% and 5.2% respectively.[7,13]

Routine uro-dynamic studies (UDS) were not performed to confirm the diagnosis of SUI in 120 patients with strongly suggestive SUI prior to surgery. Although this may be considered by some as a weakness of this study, there is available evidence to demonstrate that the cough test is a useful and reliable tool in the diagnosis of SUI.[14] It is recommended that women with clearly defined clinical diagnosis of SUI do not need routine UDSprior to surgical intervention.[15] In our setting, UDS is limited to the patients with the history of OAB symptoms. Important considerations in the use of UDS include cost, discomfort and lack of reproducibility of the procedure.[16] A recent systematic review has failed to show that performing uro-dynamic studies improves the outcome of anti-incontinence surgery.[17] In a study by Nager et al.[18] 10% of the women with positive cough (stress) tests on clinical examination did not have SUI on urodynamic studies. Their conclusion was that the stress test is more sensitive than UDS. In a limited resource setting clinical assessment alone is adequate as it is our intention to treat the patient not the findings of the UDS.

De novo detrusor instability was noted in two patients and was treated successfully with oxybutynin.

The four failures, diagnosed with a positive cough test at six months and one year of follow up were managed by reinserting a new sling. All the complications that occurred where diagnosed within the first year following the insertion of the TOT. There was no decline in the efficacy of the procedure over time demonstrating its durability in spite of aging of the study population.

Sling erosions may be secondary to surgical technique and may relate to the sling material used. The low rate of erosion in this study is because all 5 slings used were polypropylene Type 1 meshes (macroporous, monofilament), and the technique of application was correct. The strength of this study lies on the fact that the same surgeon (AC) performed all the TOTs.

Urinary retention following TOT placement has been reported in the literature as between 1.5 to 15% respectively.[10,19,20] There were no cases of urinary retention in this series. Post-operative groin or thigh complications with TOT that were found in other studies[5,12] did not occur in this study.

A sub-analysis performed by Cheng Yu Long[20] found that TVT appeared to be more painful and the possible cause was that the exit point of the TVT needle is closer to the adductor muscle and the obturator neurovascular bundle compared with the outside-in TOT. Groin or thigh pain has been found to be more common with TVT-O inside-out procedures with a reported incidence of 16%-17%.[21,22] Cadaver studies show that tapes inserted via the transobturator route using an 'outside in' technique have a lower risk of pudendal neurovascular bundle injury, as the tape may be placed further from the obturator canal and closer to the ischiopubic ramus.[23] Tapes placed with the "inside out" technique were found further from the ischiopubic ramus, and closer to the obturator canal.[24]

Two patients with UDS-demonstrated mixed urinary incontinence (MUI) were cured after TOT, in keeping with the other studies showing a 91% improvement with MUI where the stress was the most bothersome symptom.[25]

CONCLUSION

In summary, the TOT outside-in is a simple, effective, safe and minimally invasive procedure for treating SUI. It is associated with a low rate of complications and high success rate over a maximum of 8 year follow up period, with a median of 5 years and 8 months. In the presence of this good, long-term results, the TOT procedure can be recommended for the management of female stress urinary incontinence.

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Review

Female genital mutilation
Crossing the cultural and gender divides

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Abstract: Female genital mutilation (FGM) is a global issue, as it is practiced in 29 countries in Africa and the Middle East, Asia, South America, as well as by diaspora in the United States, Europe, Australia and New Zealand. It causes well-known immediate and long-term physical and psychosexual complications to girls and women, and male partners of women with FGM. Two of the main reasons for continuation of this practice are pressure of social obligation in communities and lack of discourse in the public arena and between men and women on this private and sensitive issue. However, overall the prevalence of and support for FGM is declining. Recent data suggests a focus of intervention programs on the role of men and communities' priorities to achieve better education for all and raise the status of girls and women. Approaching communities with a true sense of equality and partnership is important in building trust and achieving an understanding of their culture, and tailoring intervention programs.

Key words: Female genital mutilation; Human rights; Male attitudes; Male complications; Social obligation.

INTRODUCTION

Female genital mutilation (FGM) is a deeply entrenched cultural practice that has persisted for centuries. Despite intervention programs and advocacy for its abandonment for many decades, it continues to cause deaths and significant short- and long-term complications to the health of girls and women. Overall the practice is becoming less common in more than half of the 29 countries in Africa and the Middle East.[1] FGM is no longer regarded as an issue that affects women only, as men married to women with FGM also report physical and psychosexual problems.[2]

FGM refers to all procedures involving partial or total removal of the external female genitalia or other injury to the female genital organs for non-medical reasons. It is generally performed to girls from birth to age 15. There are four types of FGM (Table 1).[3]

TABLE 1. – WHO Classification of FGM.

Type 1	Partial or total removal of clitoris and/or prepuce
Type 2	Partial of total removal of clitoris and labia minora, with or without excision of labia majora
Type 3	Infibulation. Excision of part or all of external genitalia and stitching of the two cut sides together to varying degrees
Type 4	All other harmful procedures to female genitalia for non- medical purposes, for example pricking, piercing, incision, stretching, scraping and cauterization

In type III or infibulation, the vaginal entrance is sutured with unsterile suture-like material and usually without anaesthesia. This leads to risk of transmission of infections, including human immunodeficiency virus (HIV),[4] hepatitis, septicaemia, tetanus, haemorrhage and shock. The World Health Organization (WHO) estimates that more than 125 million girls and women in 29 African and Middle Eastern countries have undergone FGM, with three million at risk each year. It is also prevalent in some countries in Asia and in migrant communities from these countries in Europe, United States, Australia and New Zealand.[1]

Overall the support for the practice is declining, even in countries where FGM is almost universal, such as Egypt and Sudan. There is, however, a discrepancy between this declining support and the continuation of this practice.[1] One of the most important issues is the lack of communication between men and women on this private and sensitive issue, which fuels the perpetuation of false beliefs and expectations.[2] Another is overcoming the cultural barrier to address the social obligation that is a major driving force.

It is important to establish a trusting relationship with communities that practice FGM and appear on the outset culturally very different and cruel to their children to those that do not practice it. The most successful programs have been those that are non-judgemental, non-coercive and address communities' priorities, which invariably are linked to attainment of their human rights.[5, 6] The true difference between people is whether their lives are protected by human rights as set out by the United Nations in 1948.[7] A girl subjected to forced child marriage can die at childbirth from obstructed labour due to a combination of underdeveloped pelvis of childhood or malnutrition from poverty, or closed or scarred vaginal introitus from FGM, and lack of access to healthcare facilities. This young girl is not the same as the one who is able to obtain an education, choose her own path in life, and is protected by laws, which are underpinned by human rights. The two girls are different in that one is protected by the human right of the child, the right to life, the right to be free of torture or cruel, inhuman or degrading treatment, the right to equality and non-discrimination on the basis of sex, the right to a standard of living adequate for the health and well-being of herself and her family, amongst others.[7]

HEALTH COMPLICATIONS OF FGM

There is a wide range of well-known immediate and long-term complications in girls and women (Table 2).

If defibulation is not performed antenatally, or a woman does not have access to obstetric health services, obstructed labour occurs with a stillborn baby (Figures 2 and 3). If obstructed labour is prolonged, a vesicovaginal or rectovaginal fistula develops from necrosis of tissues secondary to pressure of the fetal head on the pelvic floor (Figure 4).

The metal urethral catheter depicts a total severance of the urethra from the bladder (Figure 5).

A landmark, prospective, collaborative study conducted by WHO involved approximately 30,000 women across 28 obstetric centres in six African countries.[8] It clearly showed that women with FGM type 3 had a 30% higher risk of undergoing a Caesarean section, and a 70% in-

TABLE 2. – Complications of FGM in girls and women.

Immediate Complications	Long term complications
Death	Vulval abscess, ulcer, cyst, neuroma, keloid scar
Haemorrhage	Vaginal obstruction with haematocolpos, haematometra, dysmenorrhoea
Infection (HIV, hepatitis, other organisms, wound, septicaemia)	Apareunia, dyspareunia, vaginismus
Shock from haemorrhage or sepsis	Sexual dysfunction, anorgasmia
Acute severe pain	Relationship problems
Psychological trauma	Urinary incontinence, urinary tract obstruction, urinary tract infection, voiding difficulties
Fracture of bones or dislocation of joints from force of being held down	Pelvic inflammatory disease
Acute urinary retention	Chronic vulval and/or pelvic pain
Damage to urethra, anus, rectum and/or perineum	Vesicovaginal or rectovaginal fistula
	Post-traumatic stress disorder
	Depression, anxiety
	Infertility

Figure 1. – Urinary tract obstruction in an infant. This infant developed hydronephrosis and kidney damage as a result of injury to the urethra. (Courtesy: Assoc. Prof. Moustapha Toure, Mali Hospital, Bamako, Mali).

Figure 2. – Obstructed labour in a woman with infibulation. (Courtesy: Assoc. Prof. Moustapha Toure, Mali Hospital, Bamako, Mali).

crease in postpartum haemorrhage compared to women who had not undergone FGM. The perinatal mortality rate was 15%, 32% and 55% higher in women with FGM types

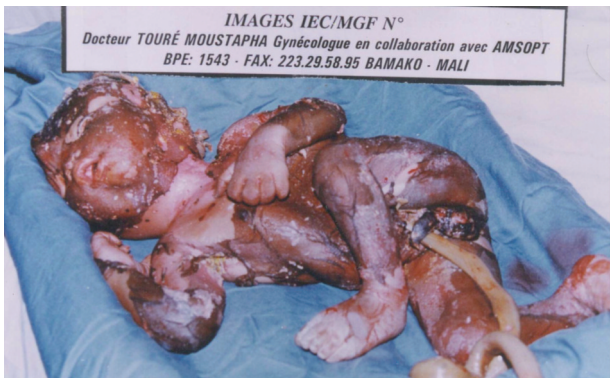

Figure 3. – Stillbirth from obstructed labour in women in Figure 2. (Courtesy: Assoc. Prof. Moustapha Toure, Mali Hospital, Bamako, Mali).

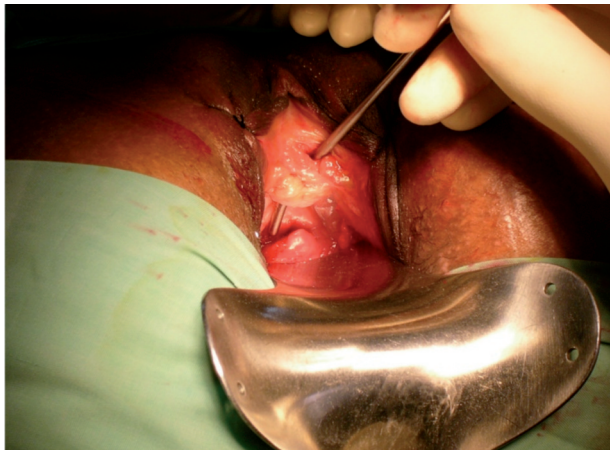

Figure 4. – Vesicovaginal fistula secondary to obstructed labour.

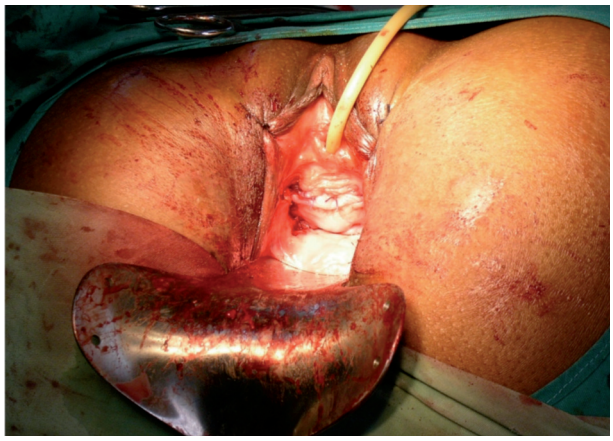

Figure 5. – Repaired vesicovaginal fistula.

1, 2 and 3, respectively. It is estimated that an additional 10 to 20 babies die per 1,000 deliveries as a result of FGM. Furthermore, newborns were 66% more likely to require resuscitation if their mothers had undergone FGM type 3.[8] These are results for women who delivered in recognised healthcare facilities or hospitals where staff were skilled at dealing with women with FGM. It can be assumed that the outcome for women delivering in remote, rural areas would be more devastating.

There are important implications for the economics of the health care systems of those countries. A WHO study on the obstetric cost of FGM estimated that 2.8 million 15-year-old girls in six African countries would lose about 130,000 years of life as a result of complications related to

obstetric mortality from FGM. It was estimated that I$ 2.50 and 5.82 (international (purchasing power) dollars adjusted for the cost of living in each country) are required for prevention programs for FGM types 2 and 3, respectively. These costs would be offset by the economic saving of managing obstetric complications from FGM.[9]

Male partners of women with FGM can have complications as well. Interviews of 59 men in Sudan revealed that the majority had difficulty in vaginal penetration, wounds and infections on the penis and psychological problems.[2] Of particular importance was the fact that the men experienced their wives' suffering as their own problem.

HOW HAS FGM PERSISTED FOR CENTURIES?

Continuation of FGM is motivated by a complex mix of socio-cultural factors, social obligation, peer pressure, fear of exclusion from resources and opportunities as a young woman and marriageability.[6 10] Whilst the reasons can vary in different communities, it generally relates back to premarital virginity, chastity and marital fidelity, and hence marriageability. FGM may be performed for perceived necessity for spiritual cleanliness, for family honour or as a rite of passage, a transition from childhood to womanhood. Effective punitive social and community measures are in place for nonconformity.[6 10]

Male attitudes to FGM were investigated in a study that interviewed 59 men in Sudan. Social acceptance or social pressure, followed by tradition, were the main reasons stated by men who preferred to marry a women with FGM. Respect from the community is intricately linked to being married to a woman of "virtue". Social obligation or normative expectations are also believed to be responsible for the wide variation in prevalence and support for FGM among different ethnic groups in many countries.

Even though no religion condones this practice, the belief that it is a religious requirement by some local religious leaders and communities, fuels its continuation. In Mali, for example, nearly two thirds of girls and women and about 40% of boys and men believe FGM is required by religion.[1]

Another possible reason is the reality and fear of sexual violence against girls, particularly in communities where infibulation is practiced, as it precludes vaginal penetration or makes it difficult. While this requires exploration in future research, evidence exists in the literature linking FGM and higher incidences of intimate partner violence (IPV).[11]

FGM has become a self-enforcing social norm, a socially upheld behavioural rule in communities.[1] People's behaviour is dependent on their beliefs about others, i.e. whether others do or do not support FGM of their daughters, their knowledge about the practice, and the interaction between social, moral and legal norms.[1, 5] Even though communities may understand the harm of FGM to their daughters and that it is illegal in their countries, the pressure of social obligation overrides the positively modifying influence of the other norms.

CROSSING THE CULTURAL AND GENDER DIVIDES

There are two very difficult barriers to cross. Foremost FGM is a highly entrenched part of people's culture. Secondly it is generally not discussed, especially between men and women. To cross the cultural divide, it may be more beneficial to take the focus away from FGM and onto an understanding and provision of the priorities of communities, including improving education of men and women and elevating the socioeconomic status of women and their communities. Crossing the gender divide requires men taking a leading role in advocacy for abandonment of FGM. Programs need to involve activities that allow open communication between men and women.[1]

EDUCATION

There is evidence that prevalence levels of FGM and support for the practice are lower among women and men who have completed higher levels of education, urban residents and those from wealthier households.[1] In a study of interviews of 2,500 men in Ghana the less educated men were three times more likely to prefer a woman who has been cut than the more educated ones.[12]

In Gambia the prevalence of FGM is about 80%. This varies greatly amongst the different ethnic groups from about 10% to almost 100%.[13] Among almost 1000 men who were interviewed in The Gambia, 72% were unaware of any health consequences. Approximately 60% of these men supported the continuation and indicated they would cut their daughters. Those, that were more educated and aware of the health consequences, wanted it to stop. Seventy-three percent of these men cited complications in women as the major reason for their support of abandonment. They also expressed the highest support of men being involved in its prevention.[13]

Awareness of health consequences by communities has taken an unexpected path of medicalisation in some countries. In Egypt and Kenya, for example, there has been an increase in girls being cut by health care professionals, despite laws criminalising the practice. As long as the pressure of social obligation persists, parents will continue to cut their daughters. They seek out health care professionals to minimise the harm to their children. Education needs to extend to doctors and nurses to become advocates of change towards abandonment.

COMMUNITIES' PRIORITIES

Engagement of high-income countries with low-income ones may be better approached on the basis of partnership instead of a donor-recipient relationship. It empowers the host party and creates better transparency of the intervention program, giving ownership and responsibility for change to the communities. Change is unlikely to happen when imposed on people. As an example, China's long-standing engagement with the continent of Africa has been based on this premise of partnership and cooperation. Its principles of engagement have been equality and mutual benefit, stress on practical results, common progress, and sovereignty of the host. It avoids the paternalism that is associated with "aid" from the West.[14]

Perhaps we can translate this "trade rather than aid" principle to our engagement with communities for FGM. The benefits and risks of the program or project, expectations and obligations of both parties are set out clearly at the outset. Requirement of a program, for example, may be a certain number of girls and boys attending school and achieving a certain level. The funding of the program may establish schools and/or pay for teachers' salaries, school transport of the children, payment to families for daily chores that daughters are otherwise obliged to carry out, preventing them from attending school etc. The school curriculum would then include harmful traditional practices, interactions with communities that do not practice FGM, and discussions with religious leaders who understand that FGM is not condoned by religion. These teachings could expand to the wider community.

Improved socioeconomic status of communities, and particularly of women, is associated with lower prevalence of FGM. With higher household wealth, people have more access to information on FGM and exposure to people and communities that do not practice it.[1] These families would see that there is no disadvantage for girls who are not cut and perhaps it gives them other opportunities for marriage where FGM is not a prerequisite.

FGM AND MEN

There is little discourse on this sensitive and private issue between men and women. It is generally assumed that men prefer to marry women who have been cut.[15] Women and girls tend to consistently underestimate the proportion of men and boys who want FGM to end.[1] Moreover, a large proportion of wives do not know their husbands' opinions of FGM.[1] The attitudes of men and women towards FGM are actually more similar than women and men believe. In Guinea, Sierra Leone and Chad, substantially more men than women expressed their support for FGM to end1. In a study of interviews of 59 men in Sudan, most young men, all of whom were married to women with FGM, expressed a preference for a woman who had not been cut.[2] Moreover 86% of them would have accepted a woman without FGM to be his son's or grandson's wife. Most of the older men had the opposite opinions.

It appears that a focus on young men to become advocates of change would be an important step in the abandonment process of FGM. Moreover, men who are well known to and liked by the public, such as football players or musicians, could help raise awareness and bring this issue to the public arena. Intervention programs can foster discussions between women, men, girls and boys,[1] so they hear each other's opinions and the perpetuation of false beliefs and expectations do not continue.

CONCLUSION

FGM remains a difficult harmful practice to abandon, as it embodies culture, sexuality, female genitalia and religion, and the need to discuss all these in public and between men and women. Nevertheless, its prevalence and support are in decline and fewer girls are cut today than their grandmothers. With continuing international commitment and collaboration, we may see the end of FGM within a generation. The way forward challenges men to take leading and active roles in the abandonment process and to assist with opening up a discourse to dispel misconceptions about FGM in general and between the genders. We need to continue to respectfully engage with communities that practice FGM and address their other priorities embodied in human rights.

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Multidisciplinary Uro-Gyne-Procto Editorial Comment

To improve the integration among the three segments of the pelvic floor, some of the articles published in **Pelviperineology** are commented on by **Urologists**, **Gynecologists**, **Proctologists/Colo Rectal Surgeons** or **other Specialists** with their critical opinion and a teaching purpose. Differences, similarities and possible relationships between the data presented and what is known in the three or more fields of competence are stressed, or the absence of any analogy is indicated. The discussion is not a peer review, it concerns concepts, ideas, theories, not the methodology of the presentation.

Gyneco... Nesrin Varol's review on Female Genital Mutilation (FGM) is quite shocking both in terms of intrinsic violence of the practice and its epidemiological size. Remarkable is the "non-violent approach" of the Author to the issue of how to promote the decline of the practice. "*The most successful programs have been those that are non-judgmental, non-coercive and address commu-*

nities' priorities, which invariably are linked to attainment of their human rights." What is more multidisciplinary, let's say multidimensional, than the above statement from Varol?

FMG is a medical problem not only in countries where ethnical communities practice it, but also in receiving countries in case of migration of these populations; the two contexts being quite different.

Since the last two decades Italy is experiencing an important migration phenomenon, including migration from geographical area most involved in FGM practices, especially the African ones. Recent data from Lombardia, the most industrialized region in northern Italy are of interest. It has been estimated that 20.000 migrant women with FGM were present in Lombardia at July 2010. The vast majority (63%) had a type I mutilation, while a minority

TABLE 1. – Estimate of FGM in the origin country and in Lombardia at July 1st 2010. Modified from P. Farina, 2011.[1]

Country	15-49 yrs in the origin Country (%)	15-49 yrs women with FMG in Lombardia
Egypt	95,8	70,7
Nigeria	10,8	74,3
Eritrea	86,0	67,5
Burkina Faso	73,6	64,5
Ivory Coast	41,2	21,7
Ethiopia	72,7	56,5
Senegal	27,7	6,7
Somalia	87,7	87,1
Ghana	4,7	3,4

(1,7%) refer the most severe type III (infibulation), with a high rate (32%) of answers of unknown mutilation. The prevalence and attitudes within different ethnic communities in Lombardia are strictly correlated with the practice within the origin community (Table 1).

The only exception is Nigeria: differently from every other country the rate in Lombardia is quite higher than in the origin country (74% vs 11%). This comes from the fact that the vast majority of the Nigerian women in Lombardia come from a particular area in Nigeria where the resident ethnic group Edo still fully adhere to traditional rules, including FGM.

The attitude of migrant women through the discontinuation of the practice is of special interest: 75% of the sample intend to discontinue it, while 11,6% plan to continue and another 11% has no clear ideas. Looking the data more in detail the role of education is of paramount importance: none of the women born in Italy and generally very few among the youngest intend to continue the practice, and the same is among the women with a higher level of education[1].

Clinically speaking the review from Varol clearly depicts the potential for a multidisciplinary urological, obstetric-gynecological and colorectal involvement as a direct or indirect consequence of this practice. The most severe complications occur more frequently in the origin country.

In receiving countries significant gaps in health care professionals' knowledge and clinical practice related to FGM are well documented and complications of FGM are underreported 2. In fact major complications are uncommon. As highlighted by Lombardia's data the type of mutilation most prone to complications is reported by less than 2% of migrant women, dysmenorrhea and disorders at micturition are reported respectively by 8,4% and less than 4% of women.[1]

Clinicians in receiving countries need to improve their knowledge to provide a culturally and clinically competent care to migrant women. The cited paper from Perron et al. is specially dedicated to this purpose.[2]

We are very grateful to Nesrin Varol and to the Editor for driving our attention to this topic.

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Procto... Religious precepts and morals interfere with female sexuality mainly in developing countries and in Muslim communities; in some reports sodomy may preserve the premarital women virginity; nevertheless the published data on these topics are few and spare for the difficulty to break sexual taboos. The female genital mutilation (FGM) is an age-old practice that cause physical and psychological negative well demonstrated consequences. It is still performed in about 30 countries and the immigration in the western countries of the last decades finds doctors unprepared to assist women with FMG. It is demonstrated that they have a "higher risk for a prolonged delivery, wound infections, a postpartum blood loss of more than 500 mL, perineal tears, a resuscitation of the infant and an inpatient perinatal death.".[1] Similar conclusions have been reported in the results of a meta-analyses.[2]

Obviously FGM causes higher risk of post-delivery lesions due to the obstructed labor: as vescico-vaginal fistulas, and anal sphincter lesions;[3] perineal tears are double in FGM probably related to the higher rate of instrumental deliveries[4] and recto-vaginal fistula; these lesions are difficult to treat in developing countries and cause women isolation in own communities.

These data should push for a policy to avoid any form of genital mutilation and to prepare western doctors -obstetrics, urogynecologists and proctologists to be aware of these new problems.

Are we ready?

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Uro... This is an excellent article on the biopsychosocial effects of female genital mutilation (FGM), or if one prefers a less graphic description, procedures performed on the female external genitalia for non-medical reasons. It shows that it can have far-reaching consequences on both the subject and her partner. The author has already expounded in some detail the demographics, politics and cultural aspects of FGM. From a urological viewpoint, FGM can lead to multiple immediate and long-term sequelae, the more morbid of which include recurrent urinary sepsis, urinary incontinence and fistulae, chronic bladder outlet obstruction which may lead to stone disease, renal impairment and ultimately irreversible renal loss. Principles of urological management will be aimed at preservation of renal function to avoid subsequent need for dialysis: treating urinary infection, restore normal functional lower urinary tract anatomy, relieve outlet obstruction, and ascertain longer term follow-up to ensure patient's compliance with treatment and that improvement is maintained. Many cases would need a multidisciplinary approach including gynecology, urology, coloproctology, psychology, nursing, physiotherapy, general practice and community medicine. Community awareness by health professionals through outreach programs may lead to better education of the masses of the ill effects of FGM on bodily function, some of which may be life-threatening. Further research and investigation into this area is warranted to minimize its occurrence and its associated aftermath on the affected individuals and their families.

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Original article

MR imaging of the pudendal nerve: a one-year experience on an outpatient basis

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Abstract: Magnetic resonance (MR) neurography was used on an outpatient basis in 56 men, 244 women; mean age 41 ±0.8 and 53±1.4 years, respectively; range, 22-84 years with various pelvic floor dysfunctions and in 25 consecutive patients (8 males, 17 females; mean age, 38 years; range, 29-48 years) with chronic pelvic pain of undetermined origin to evaluate the appearance of the pudendal nerve. Most commonly, a combination of fat-suppressed T2-W and short inversion time inversion recovery (STIR) imaging sequences allowed successful depiction of nerve course anatomy and localization of lesions at site of disease, entrapment or injuries. Key images for interpretation were obtained in the axial and coronal orthogonal and oblique planes. A major disadvantage of these conventional imaging techniques is their inability to distinguish nerve from vessels due to similar MR signal intensity. To improve visualization of nerves, the bright fluid signal suppression technique should be implemented.

Key words: MR-neurography; Pudendal nerve neuropathy; Fat suppression technique; Nerve-oriented MR imaging; Blood suppression MRI.

INTRODUCTION

Despite its first description as far as 1992 by Howe and Filler and various subsequent papers[1-4] with generation of great interest almost since its inception, the practical application of MR technique to imaging of peripheral nerves, also called " MR-neurography", is still today an often overlooked and underappreciated technique. This is unfortunate, since it can be highly accurate, easy to perform and successful in many situations where other imaging techniques yield ambiguous results. In particular, MR-neurography of the pudendal nerve can produce detailed pictures in a wide variety of pathologies including nerve-compression syndromes, small nerve tumors, degenerative disease, entrapments, adhesions, and trauma.[5-10] Radiologists becoming involved in this field will experience an increasing demand for these examinations as clinicians come to rely more heavily on imaging studies for diagnosis, and to select patients for appropriate therapies. The current study was undertaken to revitalize interest in the technique and to describe which elements of the pelvic floor anatomy can be consistently used as landmarks for identification of the pudendal nerve along its entire course. Also, a description of the technical principles, including scan planes and pulse sequences, will be offered using most of existing top quality conventional scanners for optimal depiction of MRI nerve characteristics.

MATERIALS AND METHODS

Study population. The standardized MRI series of the pelvis performed during a twelve months period (January-December 2013) with conventional 1.5 T MR scanner (Philips, Achieva model, The Netherland) were retrospectively reviewed for evidence of pudendal nerve characteristics. All examinations were performed and interpreted by the same observer (P V) in close cooperation with the technical staff (B M, B F, B M, C R, C A, DeT L, F N, G G, M M, M N, R M, R R, S MC, Z A) and trained nurses (G P, M G). Patients (56 males, 244 females; mean age 41 ±0.8 and 53±1.4 years, respectively; range, 22-84 years) were referred to the diagnostic centre (Iniziativa Medica spa, Monselice, Padova, Italy) to undergo the examination on an outpatient basis for a variety of pelvic floor dysfunctions occurring alone or in combination, including chronic constipation and obstructive defecation syndrome (41%), pelvic organ prolapse (63%), minor or major fecal incontinence (18%), anal sepsis and fistula-in-ano (24%), prior colorectal and urogynecological surgery such as STARR procedure, Delorme operation and TVT or TOT procedure (39%) and abnormal pelvic organ support system from obstetric trauma (71%), as documented by physical examination. A small group of 25 consecutive patients (8 males, 17 females ; mean age, 38 years; range, 29-48 years) with chronic pelvic pain of undetermined origin was also enrolled into the study to rule out pudendal neuropathy; informed consent forms were obtained from all patients to participate in this institutional board-approved study.

Imaging technique. Transverse, coronal, and sagittal TSE T2-weighted MRIs of the pelvic region were obtained at 1.5 T with a slice thickness of 4 mm and a slice gap of 1 mm using a XL TORSO coil wrapped around the patient's pelvis. An anteroposterior frequency-encoding (right-to-left phase encoding) direction was used for the axial planes to prevent right-to-left chemical shift artifacts. With the subject in the supine position, the transverse image acquisition plane was perpendicular to the body axis. The coronal plane was perpendicular to the axial plane and parallel to the table. The sagittal plane was perpendicular to the coronal plane. In addition, oblique coronal images in the STIR pulse sequence were obtained taking the sacral promontory and the S1-3 vertebral bodies as reference, starting 0.5 cm dorsally to include the maximum gluteus muscle and ending 4 cm ventrally at the level of the arcuate ligament. Similarly, oblique axial TSE T2-W and STIR images were obtained parallel to the pubococcygeal line (PCL), starting at the anal verge up to the inferior margin of the symphysis pubis so as to include the clitoris anatomy (female).

Oblique sagittal STIR images were also acquired 3 cm laterally on the right or left to the midline taking the ischial anterior ramus as reference to visualize the neurovascular bundle along the Alcock's canal course. In a few cases, the

"black blood" pulse sequence technique was also experimentally used in an attempt to improve visualization of nerve structures. A complete summary of the technical setting for MR neurography of pudendal nerve at our institution is reported in Table 1.

Image analysis. Key images. In axial planes, 4 levels were chosen which represented consistent anatomic bony landmarks allowing identification of the course of the nerve down the pelvis after its origin in the sacral plexus, as follows: the region of the ischial margin and greater sciatic foramen (level I); the ischial spine and the roof of acetabular fossa (level II); the femoral head, neck, greater trochanter and acetabolum (level III); the ischial tuberosity, lesser trochanter, and symphysis pubis (level IV). In coronal planes, sections that lied parallel to the sacral promontory were taken at the level of the greater sciatic foramen, ischial spine and piriformis muscle (dorsally), and at the level of the symphysis pubis and arcuate ligament (ventrally). Also, midsagittal key images were analyzed to display the lumina of the organs and their relative positions with respect to the symphysis pubis (anteriorly) and to sacrococcygeal bony vertebrae (posteriorly); finally, sections parallel to the ischial rami, 2 cm on the right and on the left of the midline were obtained to depict the neurovascular bundle of the Alcock's canal.

RESULTS

With the method above described, an average number of a hundred and fifty images per patient were obtained which allowed detailed step-by-step analysis of the nerve course anatomy in the pelvis from all patients regardless of the symptom's presentation and pathology, as follows:

Axial images. T2-weighted images depicting each level of pudendal nerve course are shown in Figure 1 a,b,c,d.

At level I (a) the lumbosacral plexus is visualized just in front of the ventral aspect of the piriformis muscle which spans the aperture of the greater sciatic foramen; the nerve itself can be easily recognized as a number of "dark dots" against the hyperintense signal of the endopelvic fat. More laterally, a portion of the gluteal nerve can also be seen within the narrow fat recess bounded by the gluteus minimus muscle anteriorly and by gluteus medius muscle, posteriorly. Bony landmarks include the ischial margin and the ventral aspect of the sacrum. A section slightly lower than (a), at level II (b) shows the sciatic nerve still in close contact with the piriformis muscle as it exits the pelvis after overcoming the sacrospinous ligament. In this section the nerve is seen to assume a more elongated oval shape of low-intermediate signal intensity becoming almost iso-intense with the surrounding structures, making it more difficult to recognize. At level III (c) the nerve resumes both its vertical orientation and its dark dots appearance while descending into the narrow space between the posterior aspect of the inferior gemellus muscle and the anterior margin of the gluteal crease. More ventrally, the femoral nerve can be seen in close contact with the anterior aspect of the psoas muscle. Also visible at this level is the sacrotuberous ligament as a dark hypointense rectangular structure just in front of the gluteus maximus muscle. At level IV (d) the sciatic nerve descends through the narrow ischial tunnel between the posterior surface of the quadratus femoris muscle and the gluteus maximus muscle without contacting the obturator internus tendon. A modified axial oblique image taken at the same level is occasionally useful to display at best the distal branching area at the outlet of the Alcock's canal.

Coronal Images. T2-weighted coronal images that lie parallel to the table of the diagnostic unit at the level of the greater sciatic foramen (Figure 2a, b), show that in this orientation the section plane is roughly parallel to the fibers of distal lumbosacral spinal nerves. On the more posterior images the coccygeal part of the levator ani muscle is depicted on either side of the rectum; this section plane is ideal to display the anatomy of right and left nerve sacral roots as they exit the spine travelling in essentially linear fashion for evidence of any distortion, narrowing and focal hyperintensity, as well as regional impingement. A series of vascular and neural structures are seen along their fiber direction. At the level of the ischial spine (a), the iliococcygeus muscle and the sacrospinous/sacrotuberous ligament complex is seen. Other visible structures include the piriformis muscle which spans the space of the greater sciatic foramen, and a linear fascicle pattern of low intensity signal consistent with the sciatic nerve and its tibial and peroneal subdivision. On more anterior images (b), at the level of the urogenital diaphragm, the bladder base, urethra and distal vagina are seen. Even more ventrally, the arcuate ligament becomes visible just below the symphysis pubis.

Axial and Coronal oblique Images. Sections obtained in these planes with the STIR pulse sequence are needed to detect any abnormal hyperintense signal intensity from within the nerve while suppressing that of the surrounding fat. Most common findings observed in the patient group

TABLE 1. – Protocol for Pudendal nerve Imaging by Philips Achieva MR scanner (1.5 T) and XL TORSO coil.

Series 1 3 Plane Localizer	**Series 2 Sagittal**	**Series 3 Coronal**	**Series 4 Axial**	**Series 5 Oblique Axial**	**Series 6 Oblique Coronal**	**Series 7 Oblique Sagittal**
TR (ms)	4435	3649	4656	10259	5471	5471
TE (ms)	100	100	100	80	80	80
TI (ms)				170	170	170
BW	299,5	164	173	262	254	254
ETL	29	20	20	17	17	17
NEX	2	2	2	3	3	3
FOV (FH-RL-AP)	250*250*177	250*250*138	250*250*173	260*260*134	250*250*-112	250*250*112
Matrix	560 (256*246)	560 (264*270)	560 (264*270)	336 (192*181)	320 (160*153)	336 (160*153)
Slice/gap	3,70 – 0,13	3,5 – 0,35	3,5 – 0,35	3,5 - 1	3 - 0,5	3 – 0,5
Flip angle	90	90	90			
Pulse Sequence	FSE	FSE	FSE	BBDIR STIR	BBDIR STIR	STIR
Fold over direction	F → H	R → L	R → L	R → L	R → L	A → P

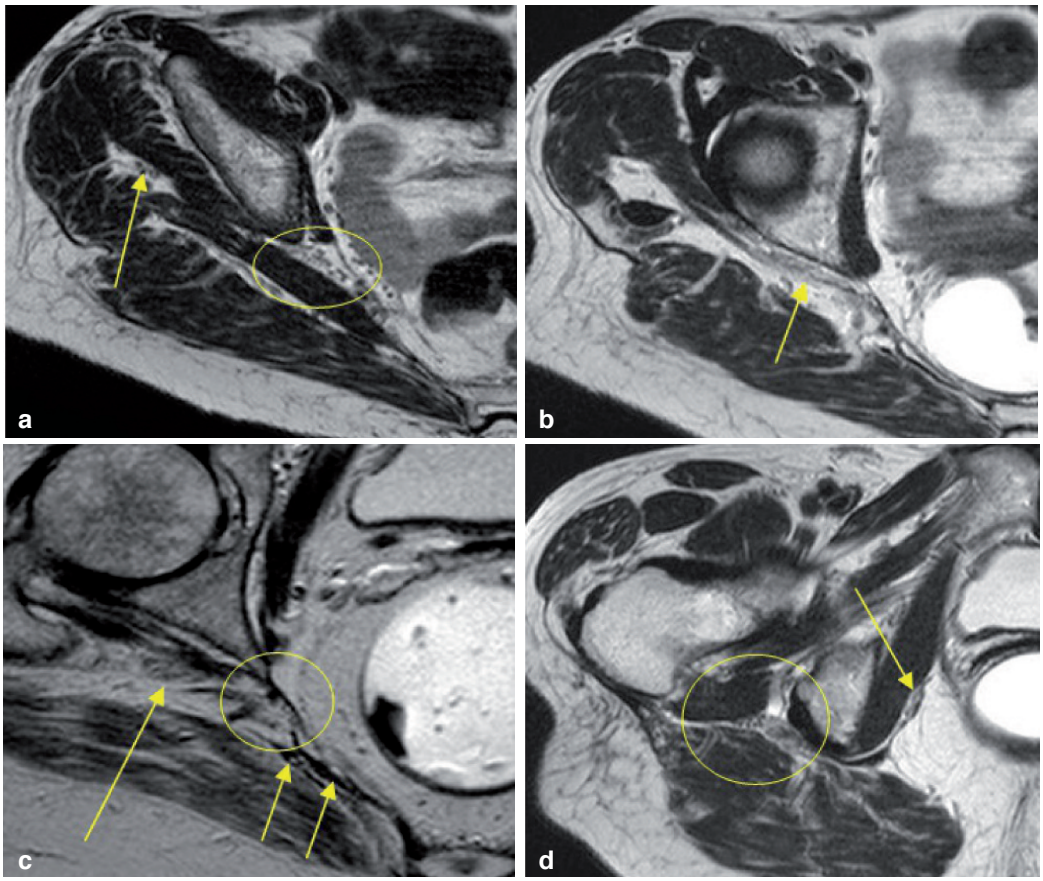


Figure 1. – Standard axial T2-W MR image (a) of the right half of the pelvis taken at the level of the ischial margin (level I) showing the "dark dots" appearance of the lumbosacral nerve (circle) just anteriorly to the piriformis muscle. The gluteal nerve (arrow) is also seen between the gluteus medius muscle, anteriorly and the gluteus maximus muscle, posteriorly. A section obtained at the level of the ischial spine (b) and greater sciatic foramen (level II) shows the nerve after exiting the pelvic cavity (arrow) as an indistinct, elongated dark structure almost iso-intense with the piriformis tendon. A section obtained at the level of the acetabulum (c) and head of femur (level III) shows the sciatic nerve (long arrow) as a more oval-shaped structure resuming its dark dots appearance. At this level the pudendal nerve reenters the pelvic cavity (circle) after encircling below the space between the sacrospinous and the sacrotuberous ligament (double short arrows). A section taken at the level of the ischial tuberosity (d) consistent with level IV shows the sciatic nerve travelling in its narrowest space (circle) between the quadratus femoris muscle and the gluteal crease. The neurovascular bundle in the Alcock's canal (arrow) is seen as a dark hypointense linear stripe just medial to the inner border of the obturator internus muscle.

with suspected or proven pudendal neuropathy included nerve image hyperintensity showing fascicular-level swelling or disruption, focal enlargement, mechanical distortion and kinking, entrapment within area of fibrofatty degeneration of adjacent muscles, and compression by prominent vessels (Figure 3). Unfortunately, however, the brightest structure in the STIR images was that of vessels with flowing blood and only prior identification of the nerve course anatomy by TSE T2-weighted sequences (Figure 4) allowed proper detection and location of nerve pathology in singular cases.

Sagittal Images. While midline sections were useful to display both the lumina of the organs and their relative positions, images taken approximately 2 cm right and left to the midline depicted at best the sacrotuberous ligament (Figure 5), the iliococcygeal muscle, the obturator internus muscle and the lateral extension of the perineal membrane. Sagittal oblique sections obtained parallel to the inferior ischiopubic rami on either side using the STIR pulse sequences are essential to depict the neurovascular bundle of the pudendal nerve contained in the sheath of the obturator fascia termed the pudendal canal (Figure 6).

DISCUSSION

From the anatomical point of view,[11] nerves are known to be a mixture of different tissues, including protein-laden axoplasmic water, myelin, fatty interfascicular epineurium, and connective tissues. Magnetic resonance imaging (MRI), thanks to its inherent superior contrast and spatial resolution, provides a unique opportunity to examine the totality of soft tissue structures in the pelvis, including the pudendal nerve along its entire course. In the past, the practical application of MRI of peripheral nerves has been limited by technical difficulties in obtaining good image contrast between nerve and neighboring tissues. Recently, however , the identification of peripheral nerves such as the pudendal nerve has become technically possible in the T2-weighted neurography images which depict the low-protein endoneurial fluid that lies within the privileged space of the endoneurium, bathes the axons and has a bulk proximal to distal flow along the nerve. Clinically, direct imaging of the lumbar/sacral spinal nerves, proximal sciatic nerve and pudendal branches can help resolve the diagnosis in many disease status including degenerative disease, entrapments , adhesions in many patients with chronic pelvic pain syndromes. Obviously, of utmost importance for image interpretation is a reappraisal of pudendal nerve topographic anatomy[12,13] down the pelvis, as follows: the pudendal nerve originates in the sacral plexus from the ventral rami of the second, third and fourth sacral nerves immediately above the upper border of the sacrotuberous ligament and the ischiococcygeus muscle. From here, the nerve passes between the piriformis muscle and ischiococ-

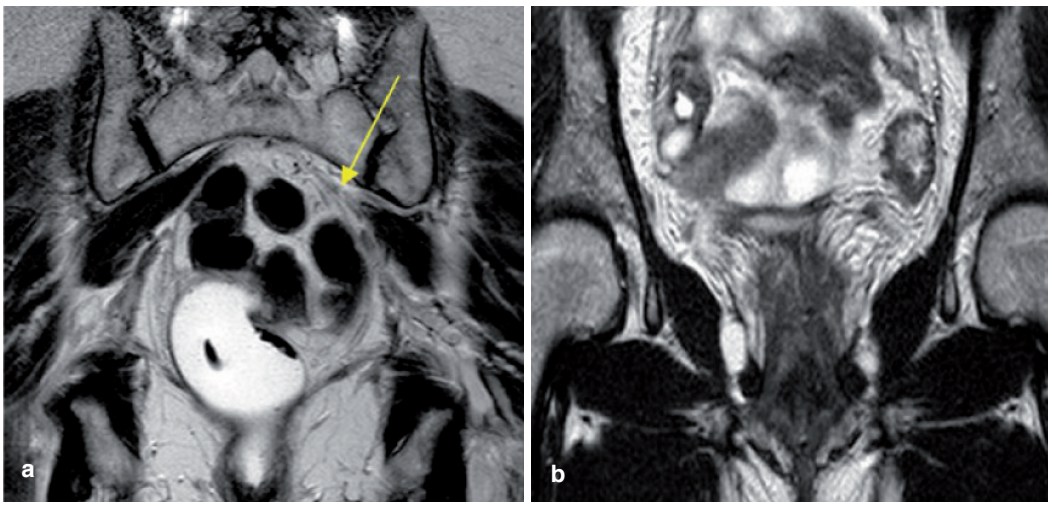


Figure 2. – Coronal T2-W MR image obtained in the posterior planes at the level of the greater sciatic foramen and sacral promontory (a): note the asymmetric hyperintense appearance of the left piriformis muscle (arrow) consistent with fibrofatty degenearation which was thought to be responsible for sciatic nerve and pudendal nerve entrapment syndrome in this 39-year old woman with history of intense bike activity. Coronal image obtained slightly anteriorly to a at the level of the acetabular fossa and obturator foramen (b) shows at best the appearance of the obturator internus and externus muscle and the pubococcygeal muscles on either side of the vagina, together with the structure of the perineal membrane.

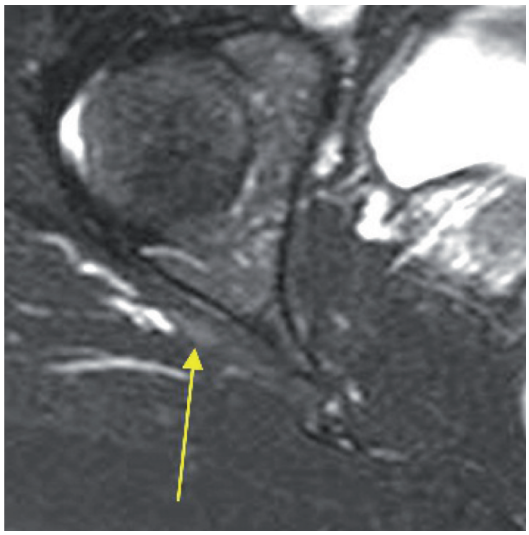


Figure 3. – Axial STIR MR image showing the close relationship of the sciatic nerve (arrow) with prominent hyperintense vessels: note that the flowing blood vessels are seen as the brightest structures in the image making the detection of nerve somewhat difficult.

cygeus muscle and leaves the pelvis through the lower part of the greater sciatic foramen; then, it enters the gluteal region and joins the pudendal artery and vein, which both accompany the nerve for the remainder of its course. This neurovascular bundle then travels inferiorly and posteriorly in the fixed space between the sacrospinous (anterior) and the sacrotuberous (posterior) ligaments. At this point, the neurovascular bundle wraps around the posterior surface of the sacrospinous ligament and turns anteriorly and laterally re-entering the pelvis through the lesser sciatic foramen; the nerve then accompanies the internal pudendal vessels upwards and forwards along the lateral wall of the ischiorectal fossa, being contained in a sheath of the obturator fascia termed the pudendal canal (Alcock's canal). Three major branches are given off from the pudendal nerve, as follows: the first branch is the *levator branch* followed by the inferior anal nerve or rectal nerve. Its origin from the pudendal nerve is highly variable and may occur at the level of sacrospinous ligament, prior to entry into Alcock's canal, in the canal itself, or after it exits the canal. The rectal branch crosses the ischioanal fossa to innervate the external anal sphincter, the distal anal canal, and the circum-anal skin. The second branch is the *perineal nerve*, which runs inferiorly in the Alcock's canal. It divides into posterior labial/scrotal (sensory) branches and muscular (motor) branches. The posterior labial/scrotal branches travel in the lateral part of urogenital triangle and supply the skin of the labia majora or scrotum. In females, the posterior labial branches also supply sensory fibers to the skin of the lower vagina. Muscular branches of the perineal nerve supply the superficial transverse perineal muscle, bulbospongiosus, ischiocavernosus, deep transverse perineal muscle, sphincter urethrae and the anterior part of the external anal sphincter, and levator ani. The third branch, *dorsal clitoral/penile nerve*, emerges from underneath the inferior ramus of the pubic bone and penetrates into the urogenital membrane. It then turns sharply cephalad, travelling between the ischio cavernosus muscle and inferior margin of the inferior pubic ramus. The nerve then makes a very sharp anterior turn entering the clitoris. It is here where the nerve begins dividing into its smaller terminal branches.

From the technical point of view, the role of the radiologist is two-fold, as follows: (a) to visualize the nerve in areas of fixation, acute flexion and narrow canals; and (b) to render the nerve as the brightest object in the image. With regard to the first point, the present study confirms that clarification of the nerve course anatomy is based on proper acquisition and interpretation of a standard set of key images, namely those obtained with TSE T2-weighted pulse sequences in the axial plane (Table 2). Additional information come from coronal orthogonal planes combined with STIR images obtained in the oblique axial, coronal and sagittal planes. With the exception of STIR images obtained on both sides parallel to the ischial tuberosities and the anterior ischio-pubic ramus to improve visualization of the Alcock's canal, acquisition in the TSE T2-weighted sagittal plane was only occasionally found useful to clarify the relationship of the pudendal nerve with the sacrospinous ligament and gluteus maximum muscle.

With regard to the second point, the question is more difficult to deal with and some limitations do exist. More particularly, at MRI, it is possible, by applying a chemical-

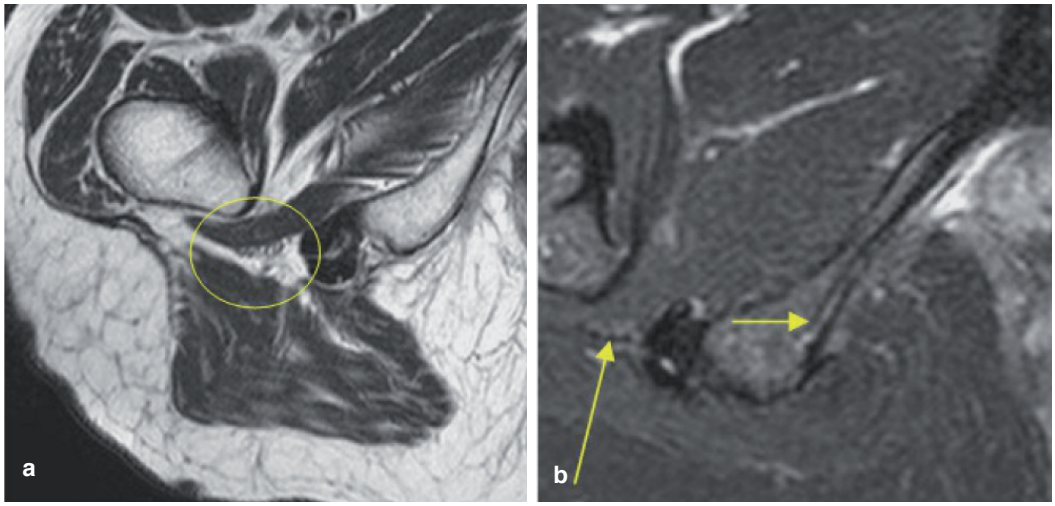


Figure 4. – The "dark dots" appearance of the sciatic nerve (a) in the preliminary "anatomic" axial T2-W images (circle) allows for adequate detection and interpretation of the slightly hyperintense fascicular pattern (long arrow) seen in the corresponding STIR images (b) which involves also the pudendal nerve in the Alcock's canal (short arrow).

shift selective pulse, to suppress much of fat signal around and from within nerves. Then, by selecting an appropriate echo time (around 90 milliseconds), a T2-weighting can be achieved resulting in suppression of fat signal, leaving most of the signal from the endoneurial fluid intact. Use of conventional (T2-weighted and STIR) neurography techniques, however, tends to leave vessel images bright too, making many small nerves that also appear in the images difficult to be distinguished. As such, in order to create the conditions that allow the generation of selective nerve images, a method should also be adopted to suppress bright fluid signal from flowing blood, also called *Black Blood techniques*,[14-16] whose effect has to do with replacement of blood in the imaging slice during the echo time (TE).

In order to obtain true black blood images ECG-gated double inversion recovery fast spin echo sequences have been reported. These employ a nonselective inversion pulse followed by a slice-selective pulse and fast spin echo readout after an inversion time TI. The inversion time is chosen to null the signal of blood, so that blood flowing into the imaging slice during TI appears dark due to the "wash-out" effect for flowing blood. Resulting images of this " signal nulling", in combination with a long "wash-in"/"wash-out" period, will display very dark blood enabling improved visualization of nerves. At our Institution this technique has not been fully implemented yet and needs more extensive research to be done before proper assessment of results.

Whatever the pulse sequence used, however, the radiologist must be aware of the anatomical basis for potential pudendal nerve compression in the following several locations along its course: as the first, the nerve can be compressed as it emerges from underneath the piriformis muscle; as the second, and most common, it may be compressed as it travels between the sacrospinous and sacrotuberous ligament; the third area of compression is Alcock's canal; the fourth is where the dorsal nerve of the clitoris/penis emerges from underneath the inferior ramus of the pubic bone and turns cephalad. Finally, compression can occur when the dorsal nerve of the clitoris/penis makes an anterior turn to enter the clitoris/penis. Identification of the presence or absence of pudendal bundle hyperintensity

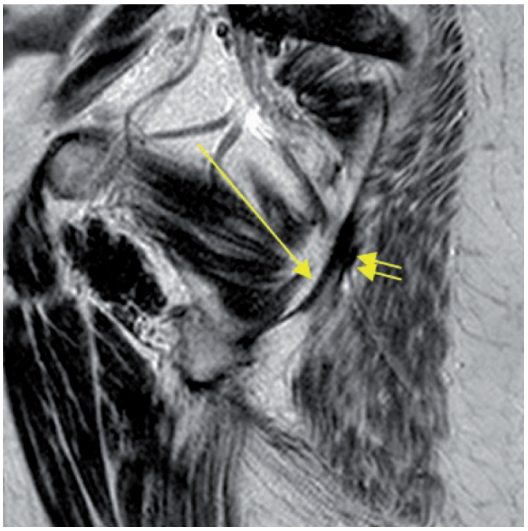


Figure 5. – Sagittal T2-W image taken almost 2 cm right of the midline at the level of the ischial spine, showing the sacrotuberous ligament (long arrow) encroaching the sacrospinous ligament (double short arrows). Note also the obturator internus muscle, anteriorly and the gluteus maximus muscle, posteriorly.

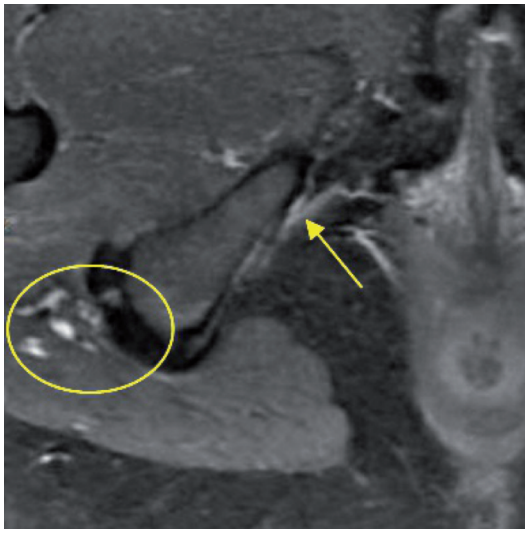
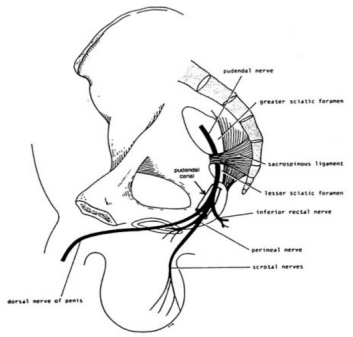


Figure 6. – Axial oblique STIR image showing at best the high signal intensity from the assons of the sciatic nerve in close contact with prominent vessels (circle) and clear hyperintensity along the pudendal nerve consistent with irritation and edema (arrow point at vessels).

TABLE 2. – Anatomic landmarks and pudendal nerve pathway reconstruction by level at axial MR imaging.



Level	Bone	Muscle	Tendon/ ligaments
I	Ischial margin Greater foramen sacrum	Gluteus minimus medium, maximus(*) piriformis	
II	Ischial spine Coccyx, roof of acetabular fossa	Coccygeus Obturator internus	Sacrospinous Sacrotuberous Piriformis
III	head, neck, trochanter of femur, acetabulum	Pettineus, gemellus obturator int/ext	Sacrotuberous
IV	Ischial tuberosity Symphysis pubis	Quadratus femoris	Anococcygeal Arcuate

Note (*) The gluteus maximus muscle is visible from level I to level IV

consistent with nerve irritation by the radiologist, however, is only one factor contributing to the success of the examination and to the development of a well-run outpatient imaging centre devoted to the diagnosis of pudendal nerve pathology. Of utmost importance is also a perfect training and cooperation with both the technical staff and booking service, together with efficient nursing. The latter aspect should be emphasized since much depends on the nurse in charge who is responsible for the coordination of patient movement within the diagnostic centre, administration of notes, and collection of prior reports; the nurses should understand the nature of the disease encountered, look after equipment and contrast materials to be administered, be able to position patients correctly and reassure them about the painfulness nature of the procedure explaining in advance the sequence of the examination. Finally, a strict feedback communication with the referring physician for further investigation requests will play a critical role in patient management.

CONCLUSION

MRI neurography is the direct imaging of nerves in the body using special modifications of standard MR technique to obtain a true detailed image of a nerve in which the resonance signal arises from the nerve itself rather than from surrounding tissues or from fat in the nerve lining. Because of the intraneural source of the image signal, the technique provides a medically useful set of information about the internal state of the nerve such as the presence of irritation, nerve swelling due to edema, compression, pinch or injury. A limitation of the technique is that structures close to the nerves, such as blood vessels, have similar signal intensity. In the case of sciatic nerve and pudendal nerve, various combinations of orthogonal and oblique sagittal, coronal and axial images together with fat-suppressed and blood-suppressed pulse sequences are recommended to detect and localize lesions to specific nerve roots or to more distal location. While image interpretation by the radiologist can be time consuming and precise localization of disease difficult, a more and more extensive use of the technique is highly desirable in order to change radically the diagnosis of pelvic floor dysfunction of neurological origin.

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Original article

Multifactorial bodily representation and its effects on help seeking

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Abstract: The present paper discusses the second part of a four part series that will investigate the hypothesis that people may have biased cognitive and affective representations of the body's parts (body schema) and that this may have implications for illness behaviour, disclosure, and help seeking. To test this hypothesis, we administered a paper and pencil questionnaire to randomly selected individuals that comprised the baseline group. The results of this baseline test group from Pescara, Italy provided us with a series of statistics that mostly confirmed our hypothesis; namely that body perception of the various body parts can be parsimoniously organized on the basis of just four of the five factors suggested by the previous literature including Stigma, Vulnerability, Importance, Sexuality and Privacy, and that each body part is rated differently according to those factors. We found that the strongest resistance in help seeking occurred for the following body parts: the Anus and Genitals, which also received the highest scores on the stigma factors scale. These results were independent of age and medical history, only gender showed a moderate affect.

Key words: Body representation; Stigma; Help seeking; Intervention; Sexual parts.

INTRODUCTION

We began like Klonoff and Landrine (1992) with the assumption that representations of the body's parts reflect a sociocultural historical context of roles, norms, and values that may lend each part symbolic social, psychological, moral, and political meanings. To begin our study we identified various categories that could account for how body parts are viewed. We found support in the literature for isolating the following five dimensions that were investigated:[1]

Vulnerability. Body parts differ in their vulnerability to physical and psychosocial stressors, with some parts (e.g., heart) viewed as more vulnerable. We know through common knowledge that certain body parts can be more easily harmed. We hypothesized that people are likely to seek help quickly for parts seen as vulnerable.

Stigma. Some bodily parts are probably represented as more dirty, disgusting, and shameful than others. This comes from the beliefs that these parts are not "normal" somehow or "disfigured" and not fully socially acceptable. One hypothesis that has been put forth for stigmatization is that it exists for social control purposes.[2] We hypothesized that people are reluctant to seek help for highly stigmatized parts and that *Stigma* would be the most powerful of the dimensions because it captures a plethora of sociomoral attitudes about cleanliness, goodness vs. that which is "dirty and sinful".

Importance. Body parts probably differ in how important and useful they are viewed to be, and people might seek help quickly for dysfunction in parts viewed as important. The importance attributed to a body part may be related to its importance to maintaining life or it's usefulness.

Privacy. Privacy is probably an important dimension of the representation of body parts, and people may be more likely to seek help for a dysfunction that is visible to the public than for a hidden and private part because the first example is more accessible to scrutiny and evaluation.

Sexuality. Some body parts are likely to be viewed as more sexual than others.

Our study aimed to create a ranking system for a number of identified body parts in relation to the five factors identified above. Factor and MANOVA analyses revealed that body parts are viewed as differing in the Stigma attached to them and in the extent to which they are seen as Important, Vulnerable, Sexual, and Private, with these five dimensions found to be independent of age and health history. We also investigated which of these five factors were more strongly correlated with help seeking behaviour and which were negatively correlated with help seeking behaviour.

METHODS

Participants

One-hundred participants were randomly selected to participate in the study and asked to fill out our paper and pencil questionnaire. Four participants were excluded because they had disclosed that they had long standing psychological issues. Of the remaining ninety-six subjects, there were 36 men and 60 women that ranged in age from 18 to 69 years (mean = 37.22, standard deviation = 14.1). The questionnaires were administered at the University of Pescara (central Italy) and the rest in other previously identified public places such as gyms and parks. We checked whether participants had been to a medical specialist or had surgery (even only as an outpatient) in the last five years. In our sample, 23.3% of the participants had been to a medical specialist and 6.5% had some sort of surgery on at least one of the ten body parts investigated. The visits with the specialists were significantly more focused on Eyes (54.2%) and less focused on Hands (4.2%) compared to the other body parts, *Chi-Square* (9) = 86.682, $p < .001$. While surgery interventions were significantly more focused on Eyes (22.9%) and Mouth (14.7%) compared to the other body parts, Chi-Square (9) = 78.062, $p < .001$.

Procedure

All test subjects were current residents of Pescara, Italy. Subjects were asked to take part in a study to investigate cognitive perceptions of body parts. The individuals selected completed a questionnaire which was an evolution and an extension of the one already used by Klonoff and Landrine (1992)[1] to investigate the relationship between cognitive representations of body parts and health seeking behavior. In the questionnaire, subjects were asked to describe ten different body parts by rating each on 13 items: Important, Dirty, Private, Good, Sensitive to Stress, Embarrassing, Sexual, Useful, Disgusting, Easily Hurt, Erogenous, Ugly and Weak. Each of these descriptions was followed by a scale ranging from 1 (not at all) to 7 (extremely). Participants were asked to assess on each of these scales how each item description was associated with each of the ten different body parts. The body parts investigated were: Eyes, Mouth, Back, Hands, Lungs, Heart, Stomach, Anus, Genitals and Feet. Each participant rated all ten of these parts with the order of presentation randomized. For each body part, participants were finally asked to answer two questions on the same 7 points scale: "How quickly I would seek help if I had a problem in this part" and "How easily I would talk with my friends and family members

about this problem". Filling out the questionnaire required about 8 minutes.

RESULTS

Factor structure of the bodily representation

We aimed to test whether, consistently with the psychosocial theoretical model of the body representation described above, the participants body perception was organized on the basis of the five factors investigated: *Stigma, Vulnerability, Importance, Privacy and Sexuality*. Then we wanted to assess the weight of these factors on the body representation and finally their impact on our main variable: the propensity, in case of a problem, to talk about the body part in question and to seek medical help.

Firstly, we conducted a *principal-components analysis* with a Varimax rotation and with the number of factors retained contingent upon an eigen-value equal or greater than one. Four of the five theorized factors emerged and accounted for 66.65% of the variance. These rotated, sorted factors are illustrated in Table 1, where, very conservatively, loadings of less than .50 were omitted. The following factors emerged: *Stigma, Importance, Vulnerability* and *Sexuality*. The *Privacy* factor appeared to be incorporated into the factor *Stigma*, perhaps thus assuming the connotation of something which is inappropriate to treat publicly. *Stigma* accounted for 20.8% of the variance, *Importance* for 20.5 %, *Vulnerability* for 12.79% and *Sexuality* for 12.53%.

As in previous research, we checked if this factor structure could differ depending on age, gender or past health history (visit with a specialist or surgery) of the participants. Therefore we repeated the principal components analysis for each of these groups separately (we split the sample into two groups on the basis of the median age which was 32 years of age). The results didn't show a significant difference: for all the groups, the factor structure was essentially the same and closely matched the previous findings. Once reassured about the consistency and the stability of the four factors structure of the representation of the body parts, we proceeded in order to check the main distinctions of these representational factors among the ten parts tested with a particular focus on the Anus and Genital region. To this end, we created four perception scales using the most representative (loaded) items for the four factors. As illustrated in Table 1, *Stigma* was represented by five items (Dirty, Private, Disgusting, Embarrassing and Ugly) forming a reliable scale (a*lpha = .83*) averaged into a *Stigma Index*; *Importance* was represented by four items (Important, Useful and Good) constituting a reliable scale (a*lpha = .72*) averaged into an *Importance index*; *Sexuality* was represented by two items (Sexual and Erogenous) representing a reliable scale (a*lpha = .89*) averaged into a *Sexuality index*, and *Vulnerability* was represented by three items (Sensitive to Stress, Easily Hurt and Weak) composing a reliable scale (a*lpha = .65*) averaged into a *Vulnerability index*.

Difference among perceptions of body parts

In order to assess and rank the ten investigated body parts, and in particular the Anus and Genitals, through the lens of the reliable representation structure discussed above, we conducted a Multiple Analysis of Variance with a Duncan's post-hoc test on the *Stigma, Importance, Sexuality and Vulnerability indexes* across all ten body parts as independent variable. Body parts had a significant effect on all four indexes (respectively, F (9, 95) = 70.46, F (9, 95) = 6.97, F (9, 95) = 69.915, F (9, 95) = 8.285, for all $p < .001$). For *Stigma perception*, the Duncan Post-Hoc test showed three main body parts clusters significantly distinguished: the less stigmatized body parts were Back (2.28), Eyes (2.39), Heart (2.45) and Lungs (2.56); the moderately stigmatized parts were Hands (2.98), Mouth (3.07), Stomach (3.30) and Feet (3.38); the most stigmatized parts were Genitals (4.19) and Anus (5.11). From the *Importance index* there emerged only two significantly different body parts clusters: important parts were Feet (5.22), Anus (5.41), Back (5.43), Mouth (5,46) and Hands (5.47) while very important parts were Eyes (5.81), Lungs (5.84) and Heart (6.09), with the rest in the middle. The *Sexuality index* demonstrated a richer five cluster distinction: extremely low sexualized parts included the Lungs (2.37) and Stomach (2.55); low sexualized parts were the Heart (3.21); moderately rated items were the Back (3.74), Feet (4.06), Eyes (4.09) and Hands (4.46); highly sexualized parts were the Anus (4.89) and Mouth (5.13); and extremely highly sexualized parts were the Genitals (6.24). Finally, the *Vulnerability index* distinguished between only two clusters: moderately vulnerable parts were Hands (4.03), Feet (4.03), Mouth (4.04) and Lungs (4.23); highly vulnerable parts were Eyes (4.63), Stomach (4.87) and Heart (4.97), with the rest in the middle.

We wondered whether participants' age and gender could affect these perceptions. To check this we ran a 2 (younger vs older) by 2 (male vs female) by 10 (body parts) MANOVA on the four representation indexes. We found a main effect of age on *Importance* and *Vulnerability indexes* (respectively, $F (1, 95) = 19.312$ and $F (1, 95) = 20.124$, for both $p < .001$). Specifically, older participants perceived the body parts more important and more vulnerable compared to the younger test subjects. Furthermore, we checked whether the four body perceptions could also be affected by the past health history of the participants. A 2 (medical specialist visit vs none) by 2 (surgery vs none) by 10 (body parts) MANOVA showed a principal effect of both medical visit and surgery only on the *Stigma index*, $F (1, 95) = 3.814$, $p < .05$ and $F (1, 95) = 4.423$, $p < .05$, respectively. Specifically, participants that went to see a specialist perceived the interested body part as being less stigmatized, while participants who had undergone surgery perceived the body part as being more stigmatized.

Propensity to talk about a medical issue and to seek help

In order to make a further step toward our main goal of testing the effect of the four perceptions of body parts on the willingness to talk about medical issues and on the promptness to seek medical help, we measured the correlation between the two items assessing these dispositions and, since we found the correlation encouragingly high ($r = .585$, $p < .001$), we averaged them into a *Help Seeking index*. Then, as we did above for the other indexes, we tested the effect of body parts on help seeking running an ANOVA. We found a significant effect, $F (9, 95) = 24.472$, $p < .001$. The Duncan post-hoc test showed that body parts could be clustered into two groups with respect to the propensity to seek help: the ones with lower propensity to seek help included the Anus (5.17) and Genitals (5.3), the ones with a higher propensity included all the other investigated body parts (with an average of 6.27).

These results highlight the critical and crucial point of our psychosocial investigation: the strongest resistance in seeking help was for the Anus and Genitals, this was irrespective of the existence of a current health problem. We wondered whether this resistance could be affected by the participants' age, gender and/or health history. Therefore we ran a 2 (younger vs older) by 2 (male vs female) by 2

(medical visit vs none) by 2 (surgery vs none) by 10 (body parts) ANOVA on *Help seeking index*. The consistency of the resistance to seek help among different populations is supported by the fact that in spite of our broad analysis, we found only one variable having a moderate but significant effect on help seeking: the participants gender, $F(1, 95) = 5.374$, $p < .05$. Women tended to seek help slightly more than men.

Bodily Representation and Help Seeking

Finally, to assess the power of the four factors of the bodies perception on the propensity to seek help we ran a linear regression analysis with *Stigma, Importance, Sexuality and Vulnerability indexes* as independent variables and *Help Seeking index* as dependent variable. The regression model resulted significant, $F(3, 95) = 84.054$, $p < .001$, and the *R square* indicated that the four factors accounted for 26.1 % of the help seeking tendency. Looking closer at the impact of each single factor, we found that *Importance* had the strongest positive effect on help seeking (*beta* = .307, $t = 9.959$, $p < .001$) immediately followed by the negative effect of *Stigma* (*beta* = - .285, $t = -9.047$, $p < .001$). A more modest positive effect was exerted by *Vulnerability* (*beta* = .123, $t = 4.079$, $p < .001$) while *Sexuality* yielded a slight inhibition to help seeking (*beta* = -.077, $t = -2.568$, $p < .05$). These results lend support to the efficacy of an approach consisting in helping people to talk about medical issues and ask for help through the implementation of a double sided intervention both aimed to increase the perception about the importance of the ill body part and, to mitigate the perception of stigma associated with it.

DISCUSSION

The results of this study demonstrated that seeking help for medical needs varied across body parts and that test subjects were less likely to seek help for body parts perceived as not very important and for highly stigmatized parts. Taken as a whole, the investigation lends support for the hypothesis that people may have complex and distorted ideas and attitudes regarding the body's parts and that these may play a role in help-seeking. We found differences in the extent to which a body part is viewed as vulnerable, stigmatized, sexual and important as well as other dimensions we did not address or assess. Further research is needed to explore other possible dimensions. The consistency of the resistance to seek help among different populations is supported by the fact that in spite of our broad analysis, we found only one variable having a moderate but significant effect on help seeking: the participants gender. Women tended to seek help slightly more than men. Also we found that older participants perceived body parts as being more important and more vulnerable compared to younger test subjects. These findings need to be further investigated in additional studies. Given the gender differences we found, and that our sample consisted mostly of women, replication with male subjects will help shed light on our results. If further studies find that in fact there is a general gender effect, this would have implications for health promotion and education. A further limitation to our study was that our sample was limited with respect to, ethnicity, and specific body parts investigated, replications with larger and more diverse subjects and body parts are necessary to assess the generalizability of our findings.

TABLE 1. – Four dimensions of Body Representation and their weights.

	Stigma (I)	Importance (II)	Vulnerability (III)	Sexuality (IV)
Important		.881		
Dirty	.754			
Private	.649			
Good		.554		
Sensitive to Stress				.642
Embarassing	.796			
Sexual			.886	
Useful		.907		
Disgusting	.808			
Easily Hurt				.732
Erogeneus			.878	
Ugly	.772			
Weak				.768
Eingenvalue	3.12	3.01	1.92	1.88
% of variance	20.80%	20.50%	12.79%	12.53%

The present explorative research has carved the path for our future investigations aimed to find out, following an action-research approach, what are the most effective "communication and educational protocols" that most impact the two main factors, *importance and stigma* that emerged as being closely associated to the propensity to seek medical help. Any effective cognitive-affective intervention will have to impact these body representations in a double way: empowering the former factor and mitigating the latter factor with respect to the targeted body part. Specifically in our future research, we will focus on the Anus and Genitals as our present investigation further demonstrated that just these two body parts suffer from the highest stigma perception which is mitigated only by a moderated importance perception. Further, this biasing phenomena poses the strongest resistance for seeking medical help. In our future investigations, we will capitalize on the present results also as a source of baseline population tendencies in perceptions, evaluations and help seeking. In fact, we will proceed comparing these tendencies in different specific samples which will be exposed to the "communications interventions" that have been demonstrated in the psychosocial literature as the most effective in changing perceptions, attitudes, and behaviour.

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SOCIAL PROGRAM

Tour to Schloss Herrenchiemsee with dinner; Saturday 13th September afternoon: Start with bus at 12:00 at Literaturhaus - Fee: Euro 100,-- (including transport, guide, coffee break, dinner). Please make reservation: Secretary Mir Heidari, E-mail: MirHeidari@chkmb.de - Key-word: Herrenchiemsee

Conference Gala Dinner at Spatenhaus (Residenzstrasse 12, 1. Floor) with view to the Opera house, Sunday Sept. 14th
Fee: Euro 90,--. Please make reservation: Secretary Mir-Heidari - E-mail: MirHeidari@chkmb.de - Key-word: Dinner Spatenhaus.

Recommended pre and post tours: 2-3 day tour to Berchtesgaden and Salzburg (www.berchtesgaden.de, www.salzburg.info - 1 day tour to Schloss Neuschwanstein (www.neuschwanstein.com) - tours and events in Munich and surroundings (www.muenchen.de).

Pre-Conference Workshops:

Thursday 4th and Friday 5th of September - Pre-Conference Satellite Workshop in Terneuzen, Netherlands (CPD-points: 12)
"Multisurgeon live Master Class in Vaginal Native Tissue Surgery". *This Master Class will be limited to only 30 attendees on a first come first served basis*. Faculty: Andri Nieuwoudt, Carl Zimmerman, Sunil Doshi. Contact Andri Nieuwoudt: E-mail: nieuwoudt@gmail.comFee: will be anounced

Thursday, 11th September 2014 - Pre-Conference Live-Surgeries (CPD-points available)
Chirurgische Klinik München-Bogenhausen, Denninger Str. 44 - TFS-surgery for POP and incontinence - Elevate anterior/apical in vaginal prolapse - Advance sling for male stress urinary incontinence - Artificial sphincter in male stress urinary incontinence - Lectures with interactive discussions will take place between the surgeries.
Faculty: B. Liedl, P. Petros, A. Gunnemann, C. Zimmerman, R. Reid, L. Lander, M. Haverfield, Y. Sekiguchi, H. Inoue
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CONFERENCE PROGRAM

Friday, 12th September 2014 - Literaturhaus, Salvatorplatz 1

08:00 Registration. Introduction and welcome by B. Liedl, President

08:35 *Actual status of the FDA warning against mesh and consequences* (Chairmen: R. Reid, K. Göschen): - FDA warning against meshes at the pelvic floor: actual sight (M. Neumann) - Meshes from the view of pathology and law experiences as expert witness in the USA (B. Klosterhalfen) - From the polymer to the optimal textile implant a challenge for the engineer (A. Müllen, B. Obolenski)

10:00 *Principles of pelvic floor surgery* (Chairman: C. Zimmerman, B. Abendstein): - An Update on the Anatomy of Level One and Level Three Vaginal Supports (L. Lander) - An Update on the Anatomy of level Two Supports (R. Reid) - Development of midurethral sling and TFS-surgery: experimental phase and clinical development (P. Petros) - The basic Principles of Vaginal Native Tissue Repair; Synthetic material Repair; Third generation Biograft Repair (L. Lander) - Basis and technique of site specific repair in prolapse surgery (C. Zimmerman) - Thoughts on Regenerative Vaginal surgery (A. Nieuwoudt)

13:15 *Actual longterm experiences in the use of meshes at the pelvic floor* (Chairmen: C. Fünfgeld, A.Gunnemann): - Results of the multi-center PARETO-mesh-study (A. Fahrtmann) - Impact of mesh supported anterior colpoplasty on life quality and sexual function (B. Fünfgeld) – Two year followup results in the use of Elevate anterior/apical and Elevate posterior/apical (B. Liedl, Propel-study-group) - Longterm results of uterin preservation in cases of uterine prolapse with single incision vaginal mesh, a retrospective case series (K. Fink, N.M. Braun) - TFS surgery for 3rd & 4th degree POP- 5 year data (H. Inoue)

14:50 *Mesh-surgery: technical variations* (Chairmen: M. Neumann, C. Fahrtmann): - The SERAPRO, an innovativ re-usable suturing device for trans-vaginal Sacrospinous fixation: Feasibility and Safety study (T. Friedman, M. Neuman, H. Krissi) - Reduction of the mesh implants surface area with pelvi organ prolapse surgical repair (N. Sumerova, D. Pushkar, M. Neuman, K. Haim) - First results with mini vaginal mesh implant for pelvic floor prolapse repair: a prospective multi-center study (N. Marcus-Braun, A. Tsivian, M. Halaska, M. Neuman) - The rational of mesh usage in the pelvic floor repair: What do we expect? (A. Sivasioglu) - Surgical approach to 4. Degress total prolapse of the pelvic organs (K. Goeschen) - TFS surgery for POP under LA (Y. Sekiguchi)

Saturday, 13th September 2014 - Literaturhaus, Salvatorplatz

08:30 *Reconstruction of Vagina, Treatment of lymphedema* (Chairmen: P. Petros, R. Baumeister): - Reconstruction of vagina in transsexualism, after surgery or radiotherapy (B. Liedl) - Tethered vagina syndrome: pathophysiology, diagnostics and surgical repair (K. Goeschen) - Microsurgical reconstruction in iatrogenic lymphedemas-state of the art (R. Baumeister)

09:45 *Miscellaneous* (Chairmen: A. Gunnemann, A. Nieuwoudt): - Nocturia: causes and therapeutical approaches (C. Merz) - Nocturia caused by apical descent (A. Gunnemann) - Female urethral diverticulum: development of a new operative procedure (O. Markovsky, B. Liedl) - Botox in OAB and neurogenic bladder (I. Schorsch)

Sunday, 14th Sept 2014 - Literaturhaus, Salvatorplatz

09:00 *Complex pelvic floor dysfunctions - therapeutic strategies* (Chairmen: S. Sutherland, F. Wagenlehner): - From experimental research to future drug therapy (D. Gratzke) - Neuromodulation: review (S. Sutherland) - From function of sarcomeres to pelvic floor dysfunction - Experiences in 500 cases with posterior fornix syndrome (A. Müller-Funogea) - The diagnostic algorithm, statistical analysis in 160 patients (B. Liedl, A. Yassouridis)

10:40 *Cure of non-neurogenic urge incontinence* (Chairmen: T. Bschleipfer, W. Jaeger): - Pathophysiology of OAB (T. Bschleipfer) - Cure of urge incontinence by TFS surgery (P. Petros) - Surgical treatment of urge incontinence by VASA/CESA (W. Jaeger) - Impact of apical fixation in mesh-supported anterior colpoplasty on urge incontinence (C. Fünfgeld) - Effect of Elevate anterior and posterior on OABsymptoms (B. Liedl, S. Sutherland)

11:40 *Round table discussion on cases* (S. Sutherland, C. Gratzke, B. Liedl, W. Jaeger, C. Fünfgeld, P. Petros)

13:15 *Surgery in stress urinary incontinence* (Chairmen: A. Sivaslioglu, P. Petros): - Pathophysiology of stress urinary incontinence (O. Markovsky) - Surgical treatment of urinary stress incontinence with an adjustable, retropubic tension-free vaginal tape (TVA, AMI) in women with risk factors (A. Niesel, E. Faust) - Simultaneous treatment of stress urinary incontinence accompanied by cystocele with the cystocele mesh: a comparative prospective study (N. Marcus-Braun, P. van Theobald) - TOT versus SIMS (A. Sivaslioglu) - Longterm results of mini-sling procedure for stress urinary incontinence in patients with mixed urinary incontinence (D. Levi, N. Marcus-Braun) - TSF surgery for USI and ISD under LA- 3 year data (Y. Sekiguchi)

14:20 *State of the art lecture:* The artificial sphincter in female and male stress urinary incontinence (R. Dahlem, M. Fisch)

14:55 *Pelvic pain* (Chairmen: F. Wagenlehner, A. Niesel): - Pelvic pain in men and women: overview (F. Wagenlehner) - Pelvic pain caused by apical prolapse: cure by Elevate anterior/apical and Elevate posterior/apical (O. Markovsky) - Pelvic pain caused by apical prolapse: cure by TFS surgery (P. Petros) - Pelvic pain following transvaginal mesh surgery: a cause for mesh removal (N. Marcus-Braun, P. van Theobald) - Pelvic pain caused by endometriosis (M. Kramer)

Monday, 14th September 2014 - Anatomische Anstalt, LMU München, Pettenkofer Strasse 11

08:30 Cadaver dissections in female and male cadavers: - Mesh surgery and female artificial sphincter (B. Liedl) – Acticon (F. Pacravan) - Male sling and different sites of cuff placement (R. Dahlem) - TFS surgery (R. Reid, B. Liedl)

11:00 Demonstration of anatomical preparations

13:30 Surgery in male stress urinary incontinence and urethral stricture (Chairman: B. Liedl): - Surgery in male urethral stricture, actual overview (R. Dahlem) - Development of the male sling Advance: actual status (C. Gozzi)

14:50 Anorectal dysfunction and pelvic floor (Chairmen: D. Gold, M. Kramer): - Fecal incontinence and abnormal emptying of bowels caused by pelvic floor defects (B. Abendstein) - TFS: Crossing the divide (D. Gold) - The artificial sphincter Acticon in fecal incontinence (F. Pacravan) - Neurological causes of anorectal dysfunction (E. Leder) - Laparoscopic approach to hyperelongated sigma and descensus (M. Kramer)

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