Editorial

This month we are pleased to present a range of clinical papers from urology, gynaecology and coloproctology that maintain the standard set in our first English issue. Pelviperineology is focussing on clinical papers that provide practical information that is of use to the clinician.

We are particularly keen to publish the results of surgeons who report what they have seen in their own practice. The best available information to improve our practice and to help raise the standard of treatment that we provide to our patients comes from randomised controlled trials. Auditing our own work and reporting our results is the first step in developing the evidence base we need design effective and appropriate trials.

Practical ways to increase the usefulness of audit data and making it easier to collect such data will be discussed at a special session of the next AAVIS Conference in Sydney this month. "Evidence in Practice" will raise this issue with presentations from a number of speakers with experience in this area. It is our intention to develop a low cost data collection system to enable clinicians who are not in academic practice to take part in the audit process and help record the clinical data that we are happy to report anecdotally but too busy to document scientifically.

In the past Pelvic Surgeons have tended to meet in the context of special interest groups or associations where a prerequisite of attendance and participation is implied agreement with the views of that particular society. Recent years have seen a steady increase in the number of cross discipline meetings and more openness between clinicians. This change can only be applauded and it is the aim of this journal to promote such meetings. If you are arranging a meeting which aims to increase inter-disciplinary communication then let us know and we will make our readers aware. Such a meeting is planned for Padua, Italy where one day workshop in Pelvic Anatomy and Surgery will be held on 23rd October 2007. Details will be available on the internet at www.integratedpelvisgroup.org

What's in a name? It is only 3 years since AAVIS decided to broaden its' base and accept members from other countries and other disciplines. Already some members are questioning the relevance of a name that implies we are only interested in vaginal incontinence surgery in Australia. Pelvic surgery seems a better option. Pelviperineology is far too big a word and would only confuse those of us who are already struggling with the name of the journal. Clearly this needs to be decided by the membership and will be an item of discussion in the months to come.

On a sad note we report the recent passing of Joe Tjandra in Melbourne. Joe was a respected Colorectal surgeon on the world stage who regularly took part in research and educational activities that many of our readers will have taken advantage of. Despite being unwell for some time Joe had continued a rigorous clinical and conference agenda until only a few days before his death. Joe had agreed to join the expanded Editorial Board of this Journal and will be sorely missed by his friends and colleagues.

THE EDITORS

PELVIPERINEOLOGY

A multidisciplinary pelvic floor journal

Pelviperineology is published quarterly. It is distributed to clinicians around the world by various pelvic floor societies. In many areas it is provided to the members of the society thanks to sponsorship by the advertisers in this journal.

The Integrated Pelvic Group (IPG) is made up of interested societies and individuals who consider the pelvis as a unit. The Interdisciplinary Society of the Pelvic Floor (SIPP, Italy), the Indonesian Society for Pelvic Floor Dysfunction and AAVIS are the foundation affiliated societies that make up the IPG.

AAVIS is a multidisciplinary pelvic floor society based in Australia and New Zealand. Membership is open to gynaecologists, urologists and colorectal surgeons with an interest in Pelvic Floor medicine.

SUBSCRIPTIONS: If you are unable to receive the journal through your local pelvic floor society or you wish to be guaranteed delivery of the journal Pelviperineology then subscription to this journal is available by becoming an International Member of AAVIS. The cost of membership is € 75 (75 euro), and this includes airmail delivery of Pelviperineology. If you wish to join AAVIS visit our website at www.aavis.org and download a membership application.

The aim of Pelviperineology is to promote an inter-disciplinary approach to the management of pelvic problems and to facilitate medical education in this area. Thanks to the support of our advertisers the journal Pelviperineology is available free of charge on the internet at *www.pelviperineology.org* The Pelvic Floor Digest is also an important part of this strategy. The PFD can be viewed in full at *www.pelvicfloordigest.org* while selected excerpts are printed each month in Pelviperineology.

Original article

Cadaveric study of ACT® balloons and their impact on female sexual anatomy

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Abstract: The adjustable continence therapy (ACT®) device has been developed for the treatment of intrinsic sphincter deficiency (ISD) using a standardised surgical technique to optimise continence efficacy. This study examined the extent of structural disruptions caused by its insertion and the possible impact of this device on female sexual anatomy. Bilateral balloon placement was performed in a female cadaver and dissection was used to determine the effect on sexual structures. The pelves were dissected layer-by-layer to examine the structures transversed by the ACT® system, particularly the clitoral tissue, adjacent neurovascular bundles, and its position in relation of the urethra, bladder neck, urogenital diaphragm and endopelvic fascia. The trocar track was observed to have coursed through a relatively "safe" zone between the bulb of the clitoris medially, the crus and clitoral neurovascular bundle anterolaterally and the perineal branches of the pudendal neurovascular bundle posteriorly. The trocar pierced the urogenital diaphragm reaching the desired position between the pelvic diaphragm and the endopelvic fascia, posterolateral to the vesicourethral junction. This method of trocar introduction caused no significant disruption of the clitoris or its neurovascular bundles in the specimens studied. Periurethral implantation of balloon devices may be safely achieved. Insertion of the ACT® trocar device in the location, direction and depth described here did not damage the clitoris or its neurovascular supply. These observations may also be of relevance to other anti-incontinence surgeries that involve instrumentation and insertion of materials beneath or by the side of the urethra.

Key words: Clitoris; Anatomy; Incontinence; Sexuality; Surgery.

INTRODUCTION

Recent anatomical studies have clarified historical accounts of female pelvic anatomy.[1] Dissection based and radiological studies have provided objective information about female pelvic anatomy and particularly the anatomy of the distal vagina where the urethra and clitoris form an erectile cluster of which the urethra and vaginal wall form a core (Fig. 1). The anatomy of the clitoris, particularly the anatomy of the bulbs of the clitoris has been presented erroneously in most anatomical textbooks – both modern and historical. These structures are large and highly vascular, flanking both the lateral vaginal wall directly under its mucosa and on either side of the urethra. They are of some relevance to urological and gynaecological surgeons who may have been unaware of their existence because of the previous paucity of basic scientific information about this anatomy. Interventions in the vicinity of the urethra and distal vagina could quite conceivably injure them, their vascular or nerve supply. The size of the bulbs has been shown to vary considerably according to age and presumably hormonal status in both cadaver and MRI-based studies.[2] Anatomical studies of peri-urethral interventions are scarce. This type of study permits screening for potential damage prior to introducing new technology. To date the anatomical impact of the ACT® device had been investigated from an intra -pelvic perspective.[3] The device ultimately becomes intra-pelvic and it is in the pelvis that the balloons exert their influence on continence. The device, however, reached this intra-pelvic location via a trans-perineal route. Placement of the balloons above the urogenital diaphragm appears to be a secure location in that the confined space limits movement that would otherwise result in ineffectiveness or prolapse of the device. Clinical experience has demonstrated that when the balloons eventuate in a supra-diaphragmatic location they do not prolapse below that level.[3] However, there are no data regarding the potential or actual impact of the devices or their insertion trocar on sexual function or anatomy. We aimed to evaluate the structures affected by standardised passage of the ACT® balloons in a cadaver using a technique developed previously to provide best placement to effect restoration of intrinsic urethral sphincter function.[4]

MATERIALS AND METHODS

During the initial development of the device and as proof of the concept, prior radiological and dissectionbased studies determined the placement technique associated with the most effective continence impact.[4]

Following standard cooling techniques maintaining a temperature of 4º Celsius, the thighs of a freshly frozen <3 days) post menopausal cadaver were abducted to expose the perineum. A Foley urethral catheter was placed and 10 cc of water instilled in the catheter balloon for easy digital identification, via the vagina, of the bladder neck when traction on the catheter was applied. Insertion of the device involves introduction of a trocar assembly unit via a small vertical incision placed at the middle of labium major of each side along the sulcus between the major and minor labia. The trocar is then directed peri urethrally parallel to the urethral Foley catheter whilst palpating the tip of the trocar through the full thickness of the anterior vaginal wall. The trocar is directed so that its tip reaches a location posterolateral to the vesicourethral junction but deep to the urogenital diaphragm. A sensation of the urogenital diaphragm "giving way" indicates that the correct depth has been reached. The balloons are then placed via the trocar. In this study the position was verified with dissection rather than radiographically as per standard clinical practice.[5]

A dissection was then performed on each side to expose the structures that had been traversed. Commencing from mons veneris and inguinal area, the dissection firstly identified the gracilis muscle its insertion marking the adjacent location of the clitoral crus. The superficial layers overlying the clitoral crus, bulbs and body were removed to demonstrate clitoral anatomy and the relationship of its components to the inserted device. The distance between the tubing of the implanted ACT® balloon and the clitoral bulb, the crus of the clitoris and the neurovascular bundles were measured.

RESULTS

Cadaveric dissection demonstrated sparing of the clitoris by careful placement of this periurethrally implanted continence device. The distances between the tubing of the previ-

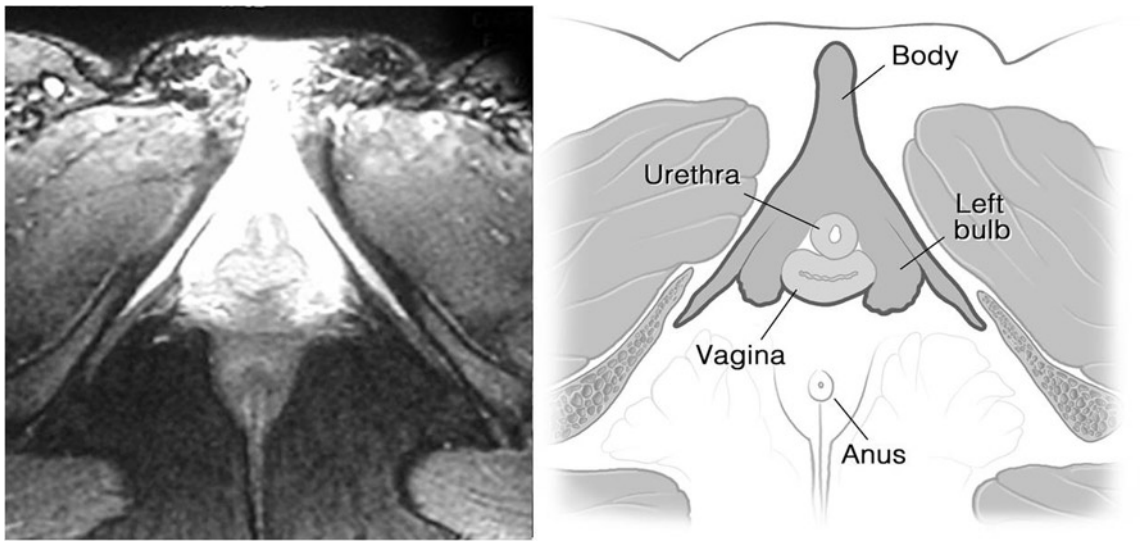

Fig. 1. – Coronal section of female erectile tissue of 76 year old fixed cadaver.

ously implanted ACT® balloon and both the vestibular bulb and the crus of the clitoris was between 1.0 cm and 1.5 cm (Fig. 2). The dorsal neurovascular structures were found to be anterior and lateral to the position of the ACT® prosthesis, at a distance of 1.5 cm or greater (Fig. 3).

The dissection of the external genital and underlying structures illustrated that if the initial incision is made at the sulcus between the labia majora and minora through the midpoint of the labium majus, and the insertion instrument is directed from this point towards the bladder neck parallel to the urethra until passage of this instrument is made under the inferior aspect of the ischiopubic rami, then disruption of the clitoral bulb or crus or the adjacent neurovascular bundle did not occur (Fig. 4). Directing the insertion instrument from a more lateral position towards the contralateral labia could produce unintended clitoral bulb disruption (Fig. 5). Existing recommendations to place the ACT® balloon device for urinary incontinence appear to avoid disruption of the clitoris, vaginal wall and neurovascular structures, preserving the structural and functional integrity of the genital anatomy. However, any deviations from recommended insertion technique, e.g. an overly medial placement or too-shallow direction of the insertion trocar may be associated with unintended clitoral injury.

The distal vaginal wall and the urogenital septum appear to be a fused structure.[6] The clitoral bulb attaches to it laterally. The perineal neurovascular bundle lies deep to the clitoral bulb on the surface of this diaphragm/vaginal wall layer. Although the trocar placement pierces the urogenital membrane (vaginal wall) close to the neurovascular bundle, in both cases a safe window appeared to have been identified which spared the bulb and other clitoral components, including their neurovascular supply. These structures remained uninjured by the trocar and the tubing of the implanted device. The dorsal neurovascular bundles are not affected by placement of the trocars or other components of the ACT® system.

DISCUSSION

The female urethra is located in the anterior vaginal wall adjacent to the clitoris, with the body of the bulb superiorly and the bulbs and crura on either sides. The urethra should be viewed as a pelvic and perineal conduit surrounded by erectile tissue. The urethra, vagina and clitoris form a triangular cluster of tissue in the perineum in demonstrations with MRI studies.[2]

This anatomical study in both sides of an elderly female cadaver have demonstrated sparing of the clitoral structures, urethra and the neurovascular supply during the implantation of the ACT® device by the method described here. In the female perineum, a "safe" area or a location relatively free of genital and neurovascular structures appear to exist between the inferomedial margin of the crus of the clitoris and the lateral surface of the clitoral bulb, forming a small 'indentation'

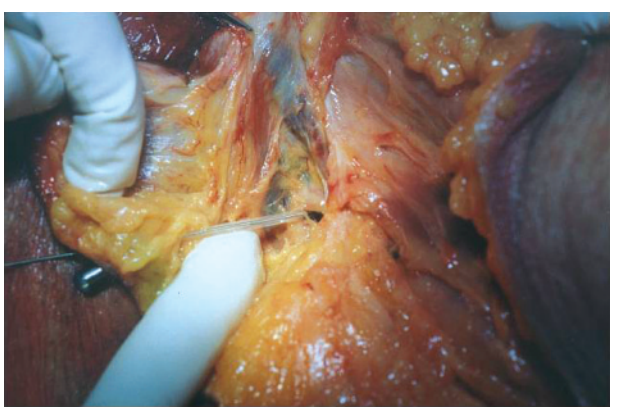

Fig. 2. – The distances between the tubing of the previously implanted ACT® balloon and both the vestibular bulb and the crus of the clitoris was between 1.0 cm and 1.5 cm.

Fig. 3. – The dorsal neurovascular structures are anterior and lateral to the position of the ACT® prosthesis, at a distance of 1.5 cm or greater and unlikely to be injured with this technology.

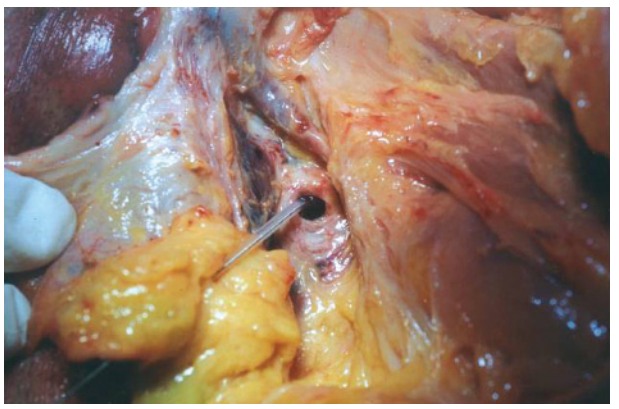

Fig. 4. – Passage of implanted device in relation to the crus, the bulbs and the dorsal neurovascular bundle showing no disruption of the clitoral bulb.

just below the inferior pubic rami. Deviations in the orientation of the trocar from the recommended are associated with anatomical evidence of probable clitoral trauma.

Erectile tissue is more extensive in premenopausal women compared to that of postmenopausal women.[7, 8] Further studies would include evaluation of placement of this and other surgical treatments in both pre- and post-menopausal cadavers. Clearly, access to premenopausal cadavers is very limited. It would be advisable to discuss the potential post-operative sexual dysfunction, especially in pre-menopausal women, prior to embarking on any suburethral surgery for urinary incontinence or pelvic organ prolapse. To date, there have been few systematic investigations of the effect of surgical treatments on sexual anatomy or function. Surgeries around the urethra, or insertion of materials designed to support the urethra, can potentially disrupt these structures and the adjacent neurovascular bundle during the surgery and/or due to inflammatory tissue responses to implanted artificial materials following surgery.

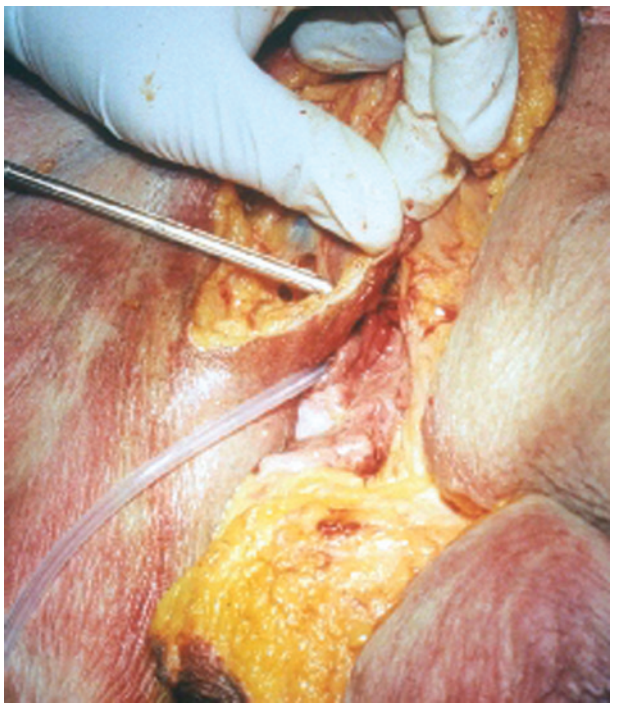

Fig. 5. – Demonstration of inappropriate trocar direction. Directing the insertion instrument from a more lateral position towards the contralateral labia could produce unintended clitoral bulb disruption.

The literature to date relating incontinence surgery to sexuality, has been focussed primarily upon the assessment of impact of the urinary leakage on the ability to enjoy sexual relations, rather than assessing changes in sexual response potentially related to the surgical trauma. The negative impact of leaking during the act of sex seems well established.[9] Weber and associates in evaluating sexual function and vaginal anatomy in 165 women both before and after surgery for pelvic organ prolapse and incontinence, noted that although most women reported an improvement or no change in their sexual function and satisfaction, 38% of women who had a combination of Burch colposuspension and posterior colporrhaphy reported dyspareunia, which was not present prior to surgery.[10] In contrast, Lalos and associates examined the sexual impact following retropubic urethropexy or pubococcygeal repair by interviewing the patients and through patient-directed questionnaires. They concluded that the majority expressed satisfaction with their sexual live.[11] Following the insertion of tension-free vaginal tapes (TVT) suburethrally, Elzevier and associates [12] and Glavind and Tetsche [13] found very little or no sexual impact in those patients who responded to the mailed questionnaires (75% and 81% respectively). Those few who did report some degree of sexual dysfunction following this surgery cited loss of libido and worsening incontinence as the cause, rather than the actual surgery. In contrast, Mazouni and associates [14] in their prospective study, using a mailed self-administered sexual questionnaire before and after the procedure, reported that 20% of their respondents were found to have developed sexual impairment after TVT implantation surgery. Dyspareunia accounted for 14.5% (none pre-operatively versus 8/71 post-operatively, $p < 0.01$) and a loss of libido in 5.4%. Yeni and associates[15] compared the pre- and post-operative sexual function in 32 women who were implanted with TVT, against a control of 25 matched but continent women. They used the Female Sexual Function Index (FSFI)[16] which specifically examines different domains of desire, arousal, orgasm, pain and overall satisfaction related to sexual function. Prior to surgery, all domains except orgasm were slightly, though not significantly, decreased in the treatment group compared to the control group. Post-operatively, all domains except for arousal and desire worsened significantly in the treatment group compared to the control group. The authors conclude that both stress urinary incontinence and the TVT procedure negatively affect sexual function in women.

Preliminary studies of the ACT® device found "discomfort during sexual intercourse" in a small number of patients, principally relating to the positioning of the injection ports dorsally in the labia majora. This experience was identified prior to the refinement of the technique as described in this study.[4, 17, 18] A later report by the European investigators described the complaint of dyspareunia in one patient (2% of the treated cohort) as transient.[19]

The ICS has recommended that sexual outcome results are to be used in the overall evaluation of all incontinence therapies.[20] Anatomical study prior to introduction of a new surgical procedure involving the urethra is appropriate.

Anti-incontinence surgeries can possibly injure the clitoris and its neurovascular supply. An effective method for inserting an ACT® device for intrinsic sphincter deficiency is described and it is found to be anatomically safe with respect to perineal anatomical structures. Adherence to the described technique is recommended as are further anatomical and functional studies of the impact of surgical techniques on female sexual anatomy and function.

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Clinical practice

Sonography of the female pelvic floor: clinical indications and techniques

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Abstract: Severe pelvic floor prolapse represents a significant diagnostic and reconstructive challenge for clinicians. Using static and dynamic perineal sonography, preoperative evaluation of the entire pelvic floor can now be performed at rest, strain and during both voiding and evacuation to determine whether laxity is global or confined to specific compartments. However, this modality shares the limitations of other techniques in this section (i.e., lack of standardization, validation, or availability). Based on our experience with more than 500 female patients over the last 5 years, our technique for performing ultrasound imaging of the pelvic floor is described including information on transducer type and orientation, image display and interpretation and quantitative description in order to illustrate the clinical utility of this non-invasive diagnostic technique.

Key words: Transperineal sonography; Pelvic floor dysfunctions; Pelvic prolapse; Descending perineum syndromes.

INTRODUCTION

Pelvic floor dysfunction usually leads to structural alterations in all compartments of the female pelvis.[1] In advanced cases, with involvement of more than one compartment, accurate identification of all structures is essential to surgical planning and success. Clinical diagnosis may be difficult so an examination that provides a wide and simultaneous evaluation of all pelvic regions is highly desirable. In the past, dynamic contrast radiography (i.e., colpocystodefecography) [2-3] has provided the only means of determining the inter-relationships which occur among pelvic organs in most common dysfunctions including double incontinence, obstructed defecation and pelvic prolapse. More recently, MRI [4-7] has provided impressive multiplanar views of the pelvis but it is limited by the duration of examination and cost. Conversely, due to its non-invasiveness, rapidity and the absence of ionizing radiation, ultrasonography of the pelvic floor (PFS), either by the transperineal (TP) or the endovaginal/introital (E/I) approach, has been successfully employed in a number of gynaecological and nongynecological conditions.[8-10] Currently, it is considered the examination of choice to start with in the diagnostic workup of urinary incontinence [11-21] and there has recently been an increased demand of it particularly on the part of coloproctologists (Tab. 1).[22-40] As the painless nature of pelvic floor sonography has resulted in high patient acceptance, we have also found that clinicians have lowered their threshold for obtaining an ultrasound examination as compared to conventional radiography. It is hoped that this lowered threshold will contribute to the earlier diagnosis of pelvic floor abnormalities.

It is important, however, to point out that a substantial "learning curve" exists with PFS and that, because of the complex anatomy being imaged, this technique may be more difficult to master than other ultrasound examinations. The purpose of the present paper is to provide the clinician with the fundamentals of the technique, the examination procedure and image interpretation to be used as a standard of reference in health and disease in order to take the best advantage of this low-cost imaging modality.

PATIENT PREPARATION AND POSITIONING

No specific preparation is required for PFS except for a partially filled urinary bladder. If needed, the rectal ampulla can also be distended just prior to the examination with hypoechoic contrast medium which is injected through a bladder-syringe. The typical dose is 60-80 ml of a 113% wt/vol semisolid barium sulfate suspension (Pronto Bario E, Bracco, Milan, Italy). This helps distinguish the pelvic organ relationships and permits the dynamic phase of rectal emptying to be depicted as well.

To maintain patient dignity, patients are appropriately covered with a draw sheet at all times, while a female assistant is brought into the diagnostic room to act as a chaperon. In addition, after adequate explanation of the procedure, patients are offered the opportunity to insert the probe themselves, if preferred.

For the examination the patient lies supine on the table with her knees bent and feet flat on the table, approximately shoulder width apart, the exposed buttocks placed over a soft rubber support. The up-right or squatting position is also used when needed.

INSTRUMENTATION AND PROBE PREPARATION

At our institution, pelvic floor sonography is initially performed by a transperineal (TP) approach, using a curved sector transducer placed between the vaginal labia minor and operating at 3.5 MHz frequency to penetrate the desired anatomy (bladder base, urethra, vaginal vault and anorectal junction) and produce a pear-shaped image on the screen. However, as a second step a 6.5-MHz phased array, end-fire vaginal endoprobe, positioned just beyond the introitus is also routinely used in order to place the transducer closer to the region of interest and provide superior axial and lateral resolution of the pelvic anatomy. In both cases, the sound waves are emitted forward from the surface of the probe tip, in line with the probe shaft, while the transducers scan through an arc of 100° and 200° degrees, respectively, over a focal range of 1 to 6 cm. Probes are used in conjunction with an ultrasound scanner machine (MyLab 50, Esaote, Genova, Italy) equipped with advanced software, freeze-frame and post-processing facilities.

Once the 6.5 MHz endoprobe has been disinfected and wiped clean a small amount of coupling gel is placed inside the finger tip of a surgical glove which is pulled over the shaft of the probe in order to prevent cross contamination between patients. The coupling gel should eliminate any air from the beam path. When the 3.5 MHz sector probe is used, its surface is draped in a layer of translucent film which is removed after use.

The sonographer wears gloves when preparing the probe and is seated on a low rotating stool nearby the patient when performing the examination.

IMAGE DISPLAY

In order to reduce difficulties in interpretation and eliminate discrepances with MRI views of the female pelvis, sonograms are adjusted so that the transducer is displayed at the bottom of the screen and the image is always generated from below upwards. To obtain this, the upside-down facility is activated, so that movements of probe and image correspond when the patient is asked to squeeze and strain. Thus, the caudal aspect of the patient's body is seen at the lower edge of the scan and the cranial at the top, the posterior on the right side and the anterior on the left (Fig. 1). On all other planes, the right and left sides are designated following the convention used for abdominal ultrasound, where the left side of the monitor corresponds to the right side of the patient and viceversa.

SCAN TECHNIQUE

It is preferable to begin the examination with the 3.5 MHz convex probe positioned at the interlabial region to obtain an overall view of the pelvic area before shifting to the higher frequency 6.5 MHz vaginal endoprobe which can be inserted or withdrawn to position the structure of interest within the focal zone of the transducer. Regardless of the probe used, the scanner image is unfrozen and the examination starts with the transducer oriented anteriorly and upward in a sagittal plane (position one) for a thorough survey of the anterior pelvic compartment. Noting the consistent position of the inferior border of the symphysis pubis on the left lower side of the screen makes it a good landmark to use when making the initial assessment. A sagittal section (longitudinal scan perpendicular to the table) of the anterior pelvis in the plane of the symphysis pubis is produced first so as to obtain direct images of the bladder base, bladder neck and urethra. From position one, the transducer is moved in a backward direction to a point where the uterovesical junction is seen (position two). This is obtained by slowly sweeping the beam posteriorly to permit visualization of the cervix, vaginal vault, Douglas pouch and the perineal body. Then, moving the transducer even more posteriorly (position three) the probe is held vertically just inside the hymenal ring for proper identification of the anorectal region and the post-anal space (Fig. 2). After this, the probe is turned 90 degrees in an anti-clockwise direction into the axial plane (scan direction perpendicular to the body's long axis) and a second series of images is obtained through the proximal urethra, anal sphincters and the puborectalis muscle. After this, the beam is sweeped again through position one, two and three to obtain also coronal views (scan direction parallel to the table) so as to demonstrate the urethra through its entire course together with the surrounding sphincters, the urethro-pelvic ligaments and levator ani muscles (Fig. 3). Following the acquisition of this basal series (at rest) from all three compartments in a rational sequence (i.e., antero-posterior direction), dynamic images of the anatomical relationships of pelvic organs during cough, strain and squeeze maneuvres are also recorded on a VHS videotape. Care should be taken so that neither the probe nor the patient moves during straining. The dynamic portion of the examination is documented as follows: after the bladder base and urethra are visualized at rest on the monitor screen, the image is frozen and stored on one half of the screen, while a second image is obtained on the other half during maximal Valsalva (or squeezing) maneuvre. The same procedure is repeated when exploring the ano-rectum and genital organs. In specific cases, as described by us in a previous paper,[40] the expulsion of hypoechoic rectal contrast can also be documented while the patient assumes a squatting position.

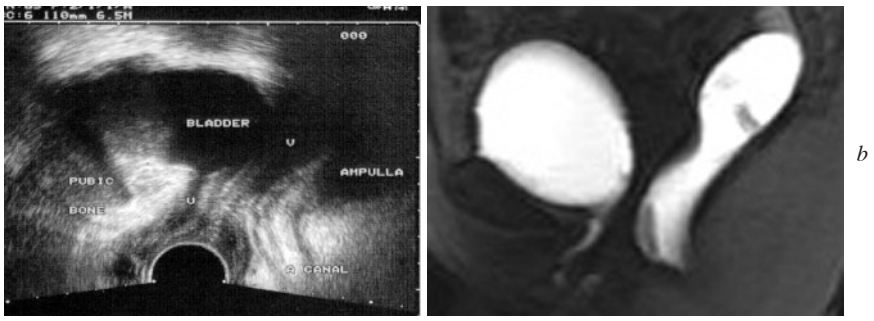
IDENTIFICATION OF SONOGRAPHIC ANATOMY

Pubic bone - It is consistently seen (identification rate, 100%) as a hypoechoic oval-shaped image on the left side of the screen, just in front of the half-filled bladder, reflecting the fibro-cartilagineous disc which connects the bony structures of symphisis pubis. Its lowermost and posterior aspect is partially surrounded by an incomplete hyperechoic ring that corresponds to the arcuate ligament; the latter is contiguous to a coarse, intensely hyperechoic laminar area representing the pubo-cervical component of the endopelvic fascia.

Bladder - Immediately posterior to the pubic bone and anterior to a normally anti-verted uterus lies the bladder. A minimally distended bladder can be seen as a thick-walled, anechoic space, lying anterior to the cervix (identification rate, 100%). The ureterovesicular junction appears as a small ridge along the posterior wall of the bladder. Often, a cloud of dynamic echoes, referred to as a urine jet, may be seen emanating from the distal ureter, reflecting normal peristalsis and a patent uretero-vesical junction.

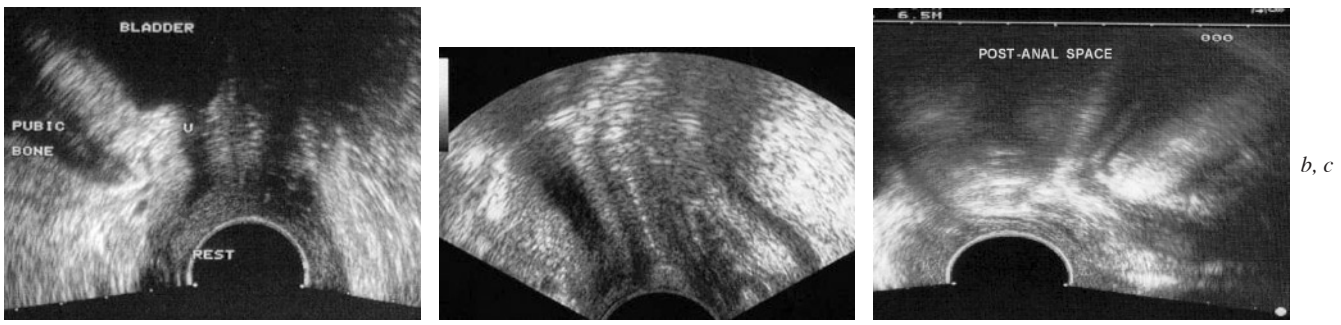
Urethra - The female urethra is a short muscular structure that extends inferiorly from the bladder and lies just anteriorly to the vagina. To image the urethra, the endoprobe must be withdrawn from its starting position at the vaginal vault until it is only partially inserted at the entrance to the vagina with the sound beam directed markedly forward and upward. In the absence of any intraurethral fluid, the apposed walls of the urethral mucosa and muscle layers can be seen on sagittal scans as a single hypoechoic line (identification rate, 100%) extending inferiorly and anteriorly to the bladder, whereas on axial scans the same structures are less frequently visualized (identification rate, 35-40%) as multiple concentric circles of various mixed echogenicity (Fig. 3*c*).

Ligaments and Muscles - Accurate scanning by PFS in



a *b*

Fig. 1. – Standardized documentation of female perineal sonogram. (*a*) Longitudinal scan: with the transducer displayed at the bottom of the screen, caudal of the patient is seen at the lower edge and cranial at the top; the left side of the scan is ventral and the right side is dorsal. The same orientation is displayed in this standard MRI sagittal scan of female pelvis (*b*).



a *b, c*

Fig. 2. – Transperineal sonographic technique: with the transducer positioned on the sagittal scanning plane just under the symphysis pubis (position one) the typical appearances of the bladder, urethra and urethro- pubic ligaments are displayed (*a*); moving probe handle anteriorly (position two), permits inclusion of the vaginal canal, utero-vesical junction and Douglas pouch (*b*) within ultrasound beam. When transducer handle is moved even further anteriorly so that a vertical position (position three) is reached the end of transducer points more caudally and the anorectum is depicted together with the post-anal space (*c*).

the coronal plane usually leads to consistent recognition (identification rate 100%) of the arcuate ligament and urethro-pelvic ligaments (Fig. 3*b*) which appear as symmetric triangular shaped hyperechoic images boundered medially by the hypoechoic urethra and laterally by the levator ani muscle.

Uterus - The normal uterus usually can be imaged in its entirety from cervix to fundus regardless of uterine version or flexion. The closest part of the uterus to the vaginal probe is the cervix. It is best delineated when the probe tip is 2 or 3 cm from the external os. The cervix appears as a relatively homogeneus and moderately echoic, smooth-walled structure. The closed endocervical canal is seen as a central stripe that appears to originate from an interface consisting of cervical mucosa and mucus. This endocervical echo is usually more echogenic than the cervical wall. During the periovulatory period, the endocervical canal may appear to be less echogenic than the cervical wall, which is probably related to a greater fluid content in the cervical mucus. Immediately lateral to the junction of the cervix and the lower uterine segment are the uterine vessels which are readily visualized as a tortuous conglomerate of anechoic "tubes". A frequent finding in the cervix is given by Nabothian cysts, which are typically less than 2 cm in size.

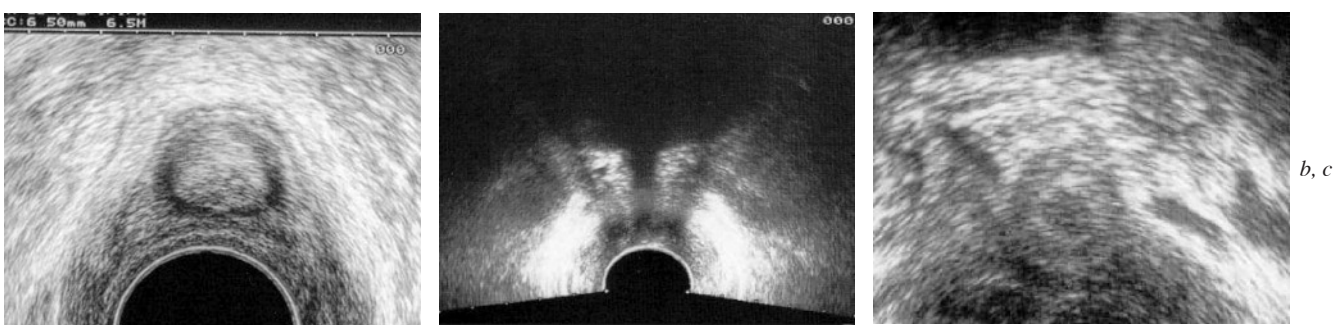
Depending on the menstrual cycle, both endometrial thickness and echogenicity change, as follows: endometrium is thin, patchy and difficult to appreciate during menstruation; it remains relatively thin and displays an echogenicity similar to that of the myometrium in the early proliferative phase (days 5-9); the superficial portion is sonographically hypoechoic whereas the deeper portion appears as a uniformly echogenic band, giving the endometrium a stratified appearance in the late proliferative phase (days 10-14); finally, the superficial endometrium continues to thicken and become more echogenic until it is intensively hyperechoic, making the central endometrial canal echo difficult to identify.

The corpus of the normal uterus has three layers of myometrium which are referred to as the outer, the middle and the inner layers. Of the three, the intermediate is the most echogenic, the outer the less visible and the inner the most hypoechoic (myometrial halo), due to its relatively sparse vasculature, compact musculature and little extracellular matrix.

Vagina - It is best demonstrated on sagittal views after gentle penetration of air by patient self digitation as a linear shaped image of hyperechoic dots (Fig. 2*b*) which correspond to air bubbles within the virtual lumen, surrounded on both sides by two symmetric and parallel hypoechoic stripes due to the mucosa-submucosa wall complex (identification rate, 67%). Overall, the vagina appears embedded and firmly fixed within a hyperechoic area which is thicker posteriorly and represents the reinforcement of the endopelvic fascia (anterior and posterior septa).

Douglas pouch - The posterior cul-de-sac (Douglas pouch), which is the most dependent region of the peritoneal cavity, is occasionally seen (identification rate, 31%) as an echogenic "V-shaped" stripe just posterior to the cervix, reflecting the interface between the posterior vaginal fornix, peritoneum and bowel loops These can easily be recognized due to their peristaltic movements. In cases of vaginal vault prolapse, dissection of the recto-vaginal septum and enterocele, free fluid, omentum or even the gut are frequently seen to impinge onto this potential space when the patient is asked to strain.

Rectal Ampulla - It is infrequently seen at sonography



a *b, c*

Fig. 3. – The scanning plane depicted in Fig. 2*c* is rotated 90° counterclockwise until a short axis view of the anal canal is obtained which displays the internal and external anal sphincters (*a*), together with the mucosa-submucosa complex and the puborectalis muscle. Then, the transducer handle is moved posteriorly to permit inclusion of the bladder, urethra and urethro-pelvic ligaments within ultrasound beam displayed on the coronal plane (*b*). Occasionally, depending on proper inclination of the urethral axis, an axial view of the four-rings target like urethra is seen (*c*).

TABLE 1. – *Clinical application of PFS: historical "road map".*

Author	*Year*	*Journal*	*Clinical application*
Brown	1985	Br J Urol	Stress incontinence
Kohorn	1986	Obstet Gynecol	Stress incontinence
Kolbl	1988	Arch Gyn Obstet	Stress incontinence
Quinn	1988	Br J Urol	Stress incontinence
Rubens	1988	AJR	Coloproctology
Hertzberg	1991	AJR	Obstetric
Chang	1993	AJR	Nongynecological
Sultan	1994	Dis Colon Rectum	Coloproctology
Kilholma	1994	Ann Chir Gynecol	Stress incontinence
Sandridge	1995	Obstet Gynecol	Anorectum
Schaer	1995	Obstet Gynecol	Contrast-enhanced studies
Schaer	1995	Obstet Gynecol	Stress incontinence
Halligan	1996	Br J Rad	Enterocele
Stewart	1996	AJR	Anal sphincter
Khullar	1996	Br J Obstet Gynaecol	Detrusor instability
Teele	1997	AJR	Pediatrics
Peschers	1997	Br J Obstet Gynaecol	Anal sphincter defects
Alexander	1997	Radiology	Fecal incontinence
Kleinubing	2000	Dis Colon Rectum	Anorectum
Kim I-O	2000	J Ultrasound	Imperforate anus
Sarnelli	2000	It J Coloproct	Posterior perineum
Piloni	2001	Techn Coloproct	Pelvic floor
Beer-Gabel	2002	Dis Colon Rectum	Pelvic floor disorders
Pregazzi	2002	Br J Obstet Gynaecol	Urinary incontinence
Lohse	2002	Eur J Obstet Gynec Reprod	Anal sphincter tears
Beer-Gabel	2002	Tech Coloproct	Obstructed defecation
Sendag	2003	Aus J Obstet Gynnaecol	Stress incontinence
Sarnelli	2003	Rad Med	Perineum
Beer-Gabel	2004	Int J Colorect Dis	Evacuatory difficulty
Wedemeyer	2004	World J Gastroenterol	Perianal Crohn
Piloni	2005	Tech Coloproct	Evacuation

(identification rate, no more than 27%) unless artificially distended by hypoechoic contrast medium. This will lead the apposed walls to diverge just above the ano-rectal junction thus allowing better visualization of relationships with adjacent structures and permitting to delineate the presence of various abnormalities such as rectocele and intussusception.

Anal Canal - Via the transperineal or the transvaginal route, the undisturbed anatomy of the anal canal is always displayed (identification rate, 100%) as follows: the internal anal sphincter is the innermost muscular structure which is the continuation of the circular part of the rectal mucosa wall. It is clearly defined as a symmetric 3-mm thick, hypoechoic ring encircling completely two-to-three triangular-shaped images of intermediate echogenicity which represent the submucosa. The virtual lumen of the anal canal is wrapped up by the hypoechoic mucosa that reproduce the shape of a clover. Directly outside the internal sphincter there is the mixed echogenic intersphincteric space. Within this space there is the relatively hypoechoic longitudinal muscle which is a continuation of the longitudinal part of the rectal muscular wall. The intersphincteric space is bordered by the relatively echoic external sphincter. The intensively hyperechoic puborectal muscle is the most peripheral structure of the upper part of the sphincter. The upper part of the anal sphincter complex is connected to the levator ani muscle (Fig. 3*a*).

Retro-anal space - It can not sharply be demonstrated on either the axial or sagittal plane (identification rate, 8-10%); the latter occasionally displays the levator plate as a thick hypoechoic stripe running parallel to the posterior rectal wall, in an almost horizontal direction until it joins the tip of coccyx. The space below the levator plane is characterized by a thick carpet of high level echoes corresponding to the sacro-coccyegeal ligaments and ano-coccygeal raphe which in the axial plane are seen to assume a hayfork-like shape.

Coccyx - This anatomic landmark is only rarely and partially seen (identification rate, 4-5%) as a hypoechoic pointed shadow, directed upward in a slightly concave manner, just behind the anal verge. A thin hypoechoic linear

image, representing the intermediate loop of the external anal sphincter, is inconsistently seen to connect the tip of coccyx to the anus.

MEASUREMENTS

There is considerable variation in the literature regarding the optimal method of performing quantitative assessment of pelvic floor structures by US perineal imaging. Our protocol includes the following:

• *Bladder neck position* - With the inferior border of the symphysis as the reference point, the x axis is constructed by drawing a line between the superior and inferior border of the symphysis (central line). The position of the anterior margin of the bladder neck with respect to x axis is noted at rest and on straining. Its minimal distance from the reference line is calculated in millimeters and expressed as a number preceded by – (above) or + (below).

• *Posterior urethro-vesical (β) angle* - According to Schaer[17] it is defined as the angle formed between a line drawn tangent the proximal half of the urethra and a line tangent the lowermost back aspect of the bladder base.

• *Anterior urethral (α) angle* - It is measured as described by Sarnelli.[36] It refers to the slope of the proximal half of the urethral axis with respect to the x axis of the pubic bone. Values are expressed in degrees and range from 60° to 110° in control groups.

• *Urethral sphincter width and thickness* - These measurements are only performed when an endoprobe operating at 6.5 MHz frequency is available. A mean width of 17.33 mm (range 15 to 20 mm); thickness of 9.3 mm (range 8 to 10 mm); smooth sphincter length of 15.1 mm (range 13 to 19 mm) and striated sphincter length of 7 mm (3 to 11 mm) are reported.

• *Bladder wall thickness* - According to Khullar [19] it is measured, when the urinary residual volume is ≤ 20 ml, perpendicular to the bladder lining at the thickest part of its four walls. A mean wall thickness of < 5 mm is seen in over 85% of patients with no evidence of detrusor instability.

• *Anal length* - According to Sandridge DA et al,[23] it is measured on sagittal scans with caliper placed at the anal verge and the anorectal junction. The latter, is assumed to be located where the gut lumen turns down over the puborectalis muscle. The same anatomical landmark is used to measure the diameter of the anus from the outside borders of the muscolaris propria.

• *The internal and external anal sphincters* - These are measured in their short axis at either the 3-, 6- or 9- o'clock position from the cross section of the anal canal at a point where it is seen to assume a perfect ring shape. The reported mean thickness is 5 mm ±1.3, range 3-7 mm (external sphincter); and 3 mm ± 0.9, range 2-5 mm (internal sphincter).

• *The thickness of the puborectalis muscle* - This is measured on axial scans in the midpoint of its lateral portion, where the muscle diverges from the anal canal. The same anatomic landmark is also used to draw a line tangent to the lateral aspect of the muscle on both sides to allow measurement of the angle formed in between, which is referred to as the *puborectalis angle*. Mean values reported are 5 mm ±1.04, range 2.5-7 mm (thickness); and 40° ± 8.8 (angle).

• *Cervix descent* - The lowermost dislocation on straining is measured relative to a line drawn tangent the central axis (x axis) of symphysis pubis.

FINDINGS IN URINARY INCONTINENCE

Sonographic changes associated with stress incontinence include (*a*) opening of the bladder neck with coughing and straining; (*b*) significant downward displacement of bladder base, and proximal urethra (mean values of –10 mm, +1-3 mm, and + 9-12 mm, are reported in conjunction with 1st degree, 2nd degree and 3rd degree urethro-cystocele, respectively); (*c*) widening of the β angle to more than 105° degrees at rest; (*d*) a 1st and 2nd degree urethral hypermobility (α angle of 110° to 135° and 135° to150°, respectively). Conversely, in conjunction with 80% of patients with intrinsic urethral defect, the following findings are noted (*a*) opening of the bladder neck and proximal urethra on minimal straining (funneling); (*b*) overall reduction of urethral muscular wall thickness; and (*c*) loss of the characteristic four-rings targetlike appearance of the urethra and hazy echogenic texture; (*d*) shift of the blood flow away from the subepithelial connective (inner) layer toward the periphery probably reflecting increased resistance within the venous plexus. Finally, in the absence of proven bladder tumor, inflammatory disease or urinary obstruction, an increase of the bladder wall thickness above 5.5 mm after voiding is seen in up to 87% of women with urge incontinence from detrusor instability.

FINDINGS IN FECAL INCONTINENCE, PERIANAL SEPSIS AND OBSTRUCTED DEFECATION

Following delivery or accidental trauma, a sphincteric defect is seen on axial images as a discrete gap in the normal continuity which corresponds to the replacement of the muscle fibres with scar tissue and fibrosis. However, given the differences in the echogenic texture present in the normal internal and external anal sphincters, the disruption appears alternatively as an hyperechoic break in a hypoechoic ring (internal sphincter defect) or a relatively hypoechoic area in a hyperechoic ring (external sphincter defect). The gap itself is usually displayed as a non-homogeneus irregular area of mixed echogenicity including high level echo spots and focal lower level echoes. Both the relative involvement of the two sphincters and the position and extent of the defect can be clearly demonstrated by PFS.

Perianal abscesses appear on axial sonograms as irregular thick-walled hypoechoic collections containing occasional bright echogenic dots (air bubbles), whose location with respect to the skin and sphincters should be established precisely. Sonographic guided localization of a fistula may also be tracked through its oblique course as a hypoechoic tract extending midway between the two sphincters and exiting just beneath the skin surface. Both the fistulous tracks and abscesses turn brilliantly hyperechoic after injection of hydrogen peroxide. This contrast is used to enhance visualization of the main track routing towards the lumen of the anal canal and to point out possible secondary tracks.

Obstructed defecation from sphincteric dyssynergia occasionally exhibits characteristic sonographic features on axial scans as follows: an inverted internal/external sphincter ratio can be seen, leading the former to reach thickness as high as 4-to-6 mm. Sagittal scans are worth to display lack of anorectal angle widening on straining in those patients with obstructed defecation due to paradoxic contraction of their puborectalis muscle.

FINDINGS IN PELVIC PROLAPSE

• *Bladder* - The key feature of prolapse of the bladder base either at rest or on straining, is its low position relative to the inferior border of the symphysis pubis. Additional changes, include distortion of urethral axis and hypermobility, bladder neck opening and descent, and increased pubo-bladder neck distance.

• *Genital organs* - With the plane of hymen (and probe)

taken as the point of reference, it is possible at sonography to diagnose (*a*) 1st degree prolapse of uterus, as displayed by descent of cervix below the plane of the bladder base and (*b*) cervical elongation as displayed by an anterior fornix projecting significantly lower than the posterior one. It has been argued, however, that PFS cannot accurately reflect any suspensory failure of the sacro-cardinal ligament complex or focal defect occurring in the endopelvic fascia since the presence of the probe at the introitus may prevent free descent of organs from reaching their deepest potential level on straining.

• *Rectal prolapse and rectocele* - On axial sonograms, the transverse diameter of the anal verge increases significantly on straining when mucous or full-thickness prolapse develop, while the typical mucosa-submucosa clover-like pattern becomes distorted. In the meanwhile, the diastasis of the internal anal sphincter makes it thinner and the external sphincter is pushed outward. Other abnormalities seen at sonography in the sagittal plane include rectocele, which appears as an outpocketing of the anterior rectal wall on straining, together with stretching of the rectovaginal septum and impingement on the perineal body. Characteristically, such an outpocketing usually disappears spontaneously when the maneuvre is discontinued.

• *Enterocele* - It is a herniation of the lining of the peritoneal cavity that extends into areas of the pelvis where peritoneum is not usually found. Its most common site is the upper portion of the posterior vagina. Frequently, a deep rectovaginal pouch is also present to serve as the entering wedge by which the hernial sac dissects downward in the space between the posterior vaginal wall and the anterior wall of the rectum. Depending on the content of the hernial sac (*i.e.* free fluid, fat or small bowel loops) the sonographic pattern varies accordingly. Traditionally, a "traction" enterocele is diagnosed when the posterior cul-de-sac is pulled down with the prolapsing cervix or vaginal cuff but it is not distended by intestines; conversely, a "pulsion" enterocele is diagnosed when the intestinal contents of the enterocele distend the recto-vaginal septum and produce a protruding mass.

PITFALLS

Sonographic evaluation of the pelvic floor is highly operator dependant, and recognition of the more common pitfalls is important. The most common problem is a poor understanding of pelvic floor anatomy and motion, which leads to confusion over the structures being imaged. Poor positioning is another common problem. Scanning the anal canal too obliquely, for example, instead of in a perfect axial plane may artificially mimic the appearance of a sphincteric defect or lead to evidence of an hypoechoic "perianal collection" and sinus tract. It is therefore important to hold the transducer in the correct position in the axial plane and continuously check it to confirm the imaging finding. Failure to maintain proper orientation and position as the transducer is moved from structure to structure and while the patient is asked to strain, cough or squeeze also produces confusing images. After surgery, the new anatomic appearances present also a common and difficult diagnostic problem because normal landmarks may be distorted. As such, an understanding of the surgical procedures is important for interpretation of ultrasonic appearances. To date, the evaluation of pelvic floor structures with US imaging has been hampered by the considerable variation existing in the literature regarding the optimal method of performing the examination in patients with pelvic floor dysfunction. Besides the differences concerning the probe and the approach used, patients may be imaged at rest, while straining, or while voiding and even defecating. Studies have been performed with and without contrast material via the vaginal, urinary or the anorectal route. Hydrogen peroxide,[16] acoustic gel [35] and Barium sulphate suspension,[40] have been used as contrast material to enhance visualization of a sinus tract, urine leakage or rectal expulsion, respectively. Imaging studies have been performed with patients in the supine and upright position whereas, for defecatory studies patients are asked to assume a squatting position. Some investigators have obtained only sagittal or axial images, while others have obtained sagittal, axial and coronal images. A similar variety of techniques affects the methods chosen by researchers for calculating the most commonly used parameters including the bladder neck – to symphysis pubis – distance, the reference lines for uretrho-vesical angles and axis inclination and so on. This variation mainly affects the measurement of bladder neck movement and urethral angulation on straining. With the inferior border of the symphysis as the reference point, some investigators have used a coordinate system based on two axes and movement was calculated as a vector length, whereas others preferred the one (central) axis system for its' simplicity in calculating the distance from the anatomic landmark mentioned above. As far as the posterior compartment is concerned, a method for calculating the depth of rectocele, one for rectal prolapse and one for the inclination of the levator plate have been described. Obviously, such a variation in technique represents a formidable obstacle when comparing the results of studies between different centres.

CONCLUSIONS

Sonographic imaging of the pelvic floor (PFS) in women, has advanced rapidly since its first introduction in 1985. It affords superior image resolution compared to the traditional transabdominal scanning approach when scanning the pelvis. Structures such as the anorectum, bladder and the rectovaginal septa are seen with excellent detail, which permits more precise interpretation of normal and pathologic states. After going through a pattern of technical evolution and equilibration with earlier techniques, PFS has become established and is currently included among the routine available imaging techniques when assessing pelvic floor dysfunction. Although the true cost-effectiveness of this imaging modality and its impact on patient care have not been established as yet, PFS has come into greater use today and progress continues at a rapid pace. The reasons for the recent unexpected upsurge of interest in PFS include the following: (*a*) a greater awareness of the fundamental and technical limitations of sonography on the part of the clinicians who now understand the optimal indications for the examination; and (*b*) an increased awareness of the needs of the pelvic floor clinicians on the part of the ultrasonographer or radiologist, who then is able to provide the expected answers to specific questions.

Provided a standard and meticulous technique is employed, PFS can produce important diagnostic information regarding the precise relationship of abnormal structures with other pelvic organs and it represents a significant step forward in the surgeon's ability to treat patients with symptoms related to pelvic prolapse, double incontinence and obstructed defecation.

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Review article

Understanding Chronic Pelvic Pain

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Abstract: Chronic pain is a complex phenomenon characterized by an interaction of sensory and emotional variables. Effective patient care can be facilitated by an understanding of the differences between acute and chronic pain and by recognition of its origins. The lack of visible pathology to explain the severity of symptoms should not be the basis for seeking psychological explanations or questioning the reality of the patient's pain. The article examines some of the psychophysiological mechanisms evident in chronic pain syndromes especially when mediated by myofascial pelvic dysfunction.

Key words: Myofascial; Trigger point; Pelvic pain syndrome; Vulvodynia.

INTRODUCTION

The importance of pain management in patient care is reflected in the recognition of pain as the fifth vital sign. As a results pain needs to be assessed and charted together with temperature, respiration, pulse, and blood pressure whenever a patient undergoes medical review. However, unlike the other vital signs, pain is difficult to define in ways that provide the clinician with practical, workable options. The challenge with pain is that there is no localised centre in the body for its control nor is there a single intervention for its effective management. Although there are various diagnostic labels to identify the location of pain and describe its qualities, these have little practical value. Labels often disguise the fact that little is known about the cause of pain its mediating mechanisms and have little bearing on the treatment, which in most instances ends up being the same. For these reasons pain poses a complex set of difficulties and the complexity increases manifold in relation to chronic pain. This paper considers some of the clinical challenges in understanding and managing chronic pain and recommends a multidisciplinary approach which recognises the importance of psychophysiological variables.

DEFINITION OF PAIN

The International Association for the Study of Pain defines pain as an unpleasant sensory and emotional experience associated with actual or potential damage to tissue.[1] This succinct definition introduces one of the most important qualities of pain, namely that it has both a sensory and an emotional component. To the ancient Greeks, pain was an affective feeling state rather then a sensory experience. In the 20th century greater emphasis was placed on the sensory component of pain.[2] With technological advances and the use of imaging techniques to map brain areas associated with the experience of pain, knowledge has taken on a new level of complexity with a recognition that pain has both sensory and emotional components.[3, 4]

It may seem highly implausible to both the patient and practitioner that the interplay of sensory and emotional variables is relevant to post surgical pain or to chronic pain syndromes involving pelvic, perineal and urogenital regions. Yet, most of these complex pain syndromes can serve to illustrate the intricate interaction between physiological, psychological and behavioural variables. Urogenital pain conditions such as vulvodynia, a form of chronic vulvar discomfort,[5] can serve to illustrate this point. This condition is characterised by burning which can vary in severity but has a disabling effect on intimate sexual behaviour and compromises the quality of life of women.[6] Vulvodynia occurs in the absence of any clinically identifiable physical or neurologic findings. Biopsies taken from the vulvar vestibule of sufferers revealed unique physiological characteristics such as increased immunoreactivity, nociceptor sensitivity, and even increased density of superficial nerve endings.[7-10] These physiological markers appear to form a constitutional predisposition to this complex pain syndrome. Evidence points to psychological traits such as anxiety as modulating the severity of pain experienced.[11, 12] Tests utilizing quantitative sensory testing in female genital sensation consistently confirmed that differences in pain thresholds between patients and controls were mediated by anxiety.[11] From these findings it is evident that enhanced pain perception, greater emotional response and increased autonomic reactivity are closely related to measures of anxiety. Anxiety and cognitive schemas, such as catastrophizing (the tendency to focus on pain and to pessimistically assess one's coping ability) not only contribute to higher levels of pain, but account for up to 31% of the variance in pain ratings.[13] Clinically, anxiety and catastrophizing serve as reliable predictors of the severity of the patient's experience of pain and should be considered in clinical assessments.

Acknowledging the subtle interaction between physical and psychological variables has other important clinical implications; it enables the clinician to discuss with the patient the need for a multi-disciplinary approach to pain management it helps the patient to be more open to accepting psychological support and encourages compliance with the use of prescription medications, which often include psychotropic medications. On a cautionary note, however, assessments of chronic pain should avoid any dualistic concepts by which the clinician attempts to determine how much of the pain is physical and how much stems from emotional factors. Attributing proportionality or labelling the physical components of pain as "real" and the emotional as "unreal" is of no clinical value and may compromises the assessment and treatment of the patient.[14]

ACUTE AND CHRONIC PAIN

Differentiating between acute and chronic pain is important in understanding chronic pelvic pain syndromes. Acute pain is most common, often experienced by patients after surgery or other soft tissue traumas. It tends to be immediate, severe and short lived however, pain that extends beyond a normal recovery period and lasts longer then 3-6 months constitutes chronic pain.

Chronic pain is more difficult to understand and often exists where there is no visible pathology. Pain continues long after soft tissue damage has occurred and persists well beyond the time of healing. In simple terms, chronic pain occurs when there is little if any reason for it to exist. Yet the pain is real and can significantly affect the patient's quality

of life, limiting their daily physical activities and disrupting their ability to rest and sleep.

When acute pain enters the chronic phase, normal sensory processes are affected by progressive sensitization of the peripheral and central nervous system. Sensitization is an important property of nociceptors and manifests itself in:

- decreased thresholds to nociceptor stimulation
- increased field of nociceptor reception (progressing from localised to generalised)
- increased nociceptor responsiveness to normally non-noxious stimuli (allodynia)
- increased intensity of response (hyperalgesia)
- prolonged post-stimulus sensations (hyperpathia), and
- the occurrence of unexplained spontaneous pain.[15]

Such sensory changes are the defining characteristics of chronic pain syndromes and require management strategies that are different to those used in the management of acute pain.

When seeking medical help, chronic pain patients often hope that tests will uncover some form of pathology or produce sufficient evidence to explain their pain. With most chronic syndromes however pain is not proportional to pathology findings. In discussing chronic pelvic pain, Steege comments on this important chronic pain anomaly:

"I'm not aware of a single chronic clinical problem associated with pain in which pain is seen as proportional to tissue damage… most clinicians intuitively or by training look for enough pathology to explain the pain. With pain this proportionality simply does not exist…the intensity of pain is not consistently related (either directly or inversely) to the apparent degree of tissue damage".[14]

Patients often hope for positive pathology findings and inadvertently look for easy answers. It is essential to inform patients about the distinctions between acute and chronic pain.

Medical reviews of chronic pain syndromes can also be influenced by individual specialty bias. Each specialty may look for information which supports their preconceptions. In relation to pain, a surgeon will focus on structural issues, a neurologist may focus on neuropathic origins, a gynaecologist may be inclined to see it as secondary to endometriosis, while a psychologist may look for unresolved and repressed emotional issues as possible explanation of pain. Likewise, patients may come in for a consult with a set of assumptions and preconceived ideas as to what the cause of their pain might be and this will not only influence their selection of specialists but also their preference of treatment. Those who seek out the services of a surgeon may do so because of their own personal belief that surgery is the best option. The need to be objective in assessing chronic pain patients is essential.

IDENTIFYING THE CAUSE OF PELVIC PAIN

The most important question for the patient and the clinician is to identify the cause of pain? In general the three most common sources of pain include:

- *Somatic origin* - arising from skin, muscles and bone tissue. Patients describe this type of pain as a throbbing, stabbing or burning.
- *Visceral origin* - coming from internal organs. This type of pain tends to be diffuse and more generalised, with patients frequently describing it in more emotive terms.
- *Neuropathic origin* - arising from damaged nerve fibres. The pain is described as numbness, pins and needles and produces electric current-like sensations.[15]

Identifying the source of pain is not always reliable but can facilitate the patient's accounts of symptoms. Of the three sources of pain, myofascial Trigger Points (TrPs) are the most common.

MYOFASCIAL PAIN

Myofascial Pain Syndrome refers to regional pain of soft tissue origin. Studies estimate that in 75-95 per cent of cases, myofascial pain is a primary cause of regional pain.[16] Myofascial pain is associated with muscle tenderness that arises from TrPs, focal points of tenderness, a few millimetres in diameter, found at multiple sites in a muscle and the fascia of muscle tissue. Biopsy tests found that trigger points were hyperirritable and electrically active muscle spindles in general muscle tissue.[17-19]

TrPs are defined by several primary characteristics:[2]

- A TrP has a clear and consistent referred pain pattern. Pain from TrPs can be felt not only at the site of its origin but also in areas remote from it. Since the pain originating from a given muscle tends to exhibit a relatively consistent pattern of pain referral, it is often possible to identify the muscle from which the pain originates if the pattern of pain is clearly delineated
- TrPs can arise in response to acute and chronic overload, or repetitive overuse of the muscle in which it occurs. Such muscle overuse can arise from muscle wind-up following physical trauma or as result of sympathetically mediated tension (anxiety related bracing and guarding/splinting)
- TrPs contribute to motor dysfunction by causing increased muscle tension (the primary function of the muscle spindles is the regulation of tension in muscle tissues), spasm of neighbouring muscles, loss of coordination in affected muscles, substitution patterns in recruitment of muscles and a weakening of affected muscles
- TrPs cause weakness and limited range of motion. In most cases the patient is only aware of the pain but not of the other dysfunctional aspects of muscle function
- The intensity and extent of the pain depends on the degree of irritability of the TrPs and not on the size or location of the muscle
- TrPs disturb the proprioceptive, nociceptive and autonomic functions of the affected anatomical region.

Pain from TrPs can go unrecognized unless the clinician is prepared to actively look and identify the source by palpating the suspected muscles. Palpation of the tender spot always evokes discomfort and assists the patient to immediately recognize and identify "their" pain. This simple and reliable means of identifying the pain confirms in the patient mind that the pain is of muscular origin and not arising from treatment related complications such as infections or scar tissue. Such specificity of diagnosis reduces the anxiety of the patient and immediately provides options for treatment. In most instances myofascial pain will respond to stretching of the muscle, message of the area, injection of TrPs and management of perpetuating factors.[16] Pelvic musculature is structurally and functionally predisposed to developing Myofascial TrPs due to its work load supporting abdominal and pelvic viscera, maintaining posture and facilitating movement.

MYOFASCIAL PAIN IN PELVIPERINEOLOGY

The presence of TrPs in pelvic muscles has been well documented.[20] TrPs in specific muscles of the posterior half of the pelvic floor can be the source of poorly defined pain in the perineal region and discomfort in the anus, rectum, coccyx and sacrum and is commonly labelled as coccygodynia or levator ani syndrome. TrPs in muscles in the anterior half of the pelvic floor refer pain to genital structures (vagina, penis and scrotum). Active TrPs in these muscles can interfere with intercourse by causing entry dyspareunia and aching pain in the perineal region. Myofascial TrPs in the deeper pelvic muscles can effect bowel and bladder

function, contributing to urethral syndrome symptoms and clitoral pain.

Myofascial TrPs and dysfunctional pelvic muscles have been frequently linked to symptoms of interstitial cystitis, urgency and frequency, pelvic pain and dyspareunia.[21-23] Palpation of pelvic muscles in patients with chronic pain symptoms not only elicits discomfort but refers pain into the suprapubic, perineal regions, rectum and labia.[24] In all reports the TrPs appeared to be linked with hypertonicity of pelvic muscles and an inability of patients to relax and exercise adequate voluntary control.[21] In reducing pelvic floor hypertonicity and manually releasing myofascial trigger points, Weiss found an 83 per cent reduction in symptoms, including a reduction in neurogenic bladder inflammation.[22] Weiss concluded that a comprehensive treatment plan for patients with chronic interstitial cystitis and urgency-frequency syndrome can decrease central nervous system sensitization and their symptoms.

Hypertonic pelvic muscles and spasm leading to chronic pelvic and perineal pain can arise in response to a range of triggers, including deep somatic or visceral disease, distressed viscera or the trauma of surgery.[2] Triggers of chronic pain can be of an acute nature, but lead to progressive neuromuscular wind up with muscle tissue not only responding to nociceptive triggers, but progressively becoming the primary "initiator of nociception" and the site of chronic pain.[27] Acute triggers such as irritants, inflammation and trauma tend to provoke a reflex-mediated muscle response which eventually leads to chronic over-activation and pain.

A PSYCHOPHYSIOLOGICAL PERSPECTIVE ON CHRONIC PAIN

The absence of visible pathology in chronic pain syndromes should not form the basis for either seeking psychological explanations or questioning the reality of the patient's pain. Instead it is essential to approach the complexity of chronic pain from a psychophysiological perspective which recognises the importance of the mind-body interaction. Some of the mechanisms by which the limbic system impacts on pain, and in particular myofascial pain, have been clarified by research findings in neurology and psychophysiology.[17, 28, 29]

Muscle tissue contains nociceptive nerve endings (pain receptors) in two specific structures. The first of these is located in the adventitia of the vascular system and the second in small organs of the muscle known as muscle spindles. Nociceptors in both of these structures are highly sensitive to pressure and are responsible for the perception of pain.[19] The early work of an Italian research team led by Pastorre, highlighted the involvement of the sympathetic nervous system in the innervation of muscles and in particular of the muscle spindle.[30] The primary function of the muscle spindle is to regulate the action of the muscle by monitoring muscle velocity, length and work load, ensuring smooth function and preventing damage to muscle tissue. It is important to note that muscle tension is sympathetically maintained through the activity of intrafusal fibers to the muscle spindle.[17] Laboratory experiments have shown sympathetic stimulation can activate muscle spindles in even curarized animals (curare is a cholinergic blocker, preventing the voluntary recruitment of muscles through the activation of motor units), while intramuscular injections of phentolamine (a sympathetic antagonist) eliminates activity in the spindle.[18]

The chronic over-activation of intrafusal fibers within the muscle spindle appears to be the underlying mechanism in the aetiology of myofascial trigger points.[17, 19] It is also noteworthy that psychological distress significantly increases the activity of TrPs [17, 28] while physiological quieting through relaxation training lowers sympathetic activity within the trigger points. This has significant implications for therapeutic interventions, where the patient suffering from chronic pain syndrome will benefit most from a psychophysiological approach to management.

Various triggers can give rise to neuromuscular wind-up. Triggers such as soft tissue injury, surgical trauma, infections and visceral disease can potentially lead to progressive sensitization in the pelvic-perineal region. The emotional disposition of the patient and their coping mechanisms can, in turn, impact on the perception of pain. Various models have been proposed elucidating the mechanisms by which this can occur. With anxiety as the best predictor of pain thresholds, the psychophysiological model provides the most rational approach to the care of the chronic pain patient.

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Pelvic Floor Digest

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Set-up and statistical validation of a new scoring system for obstructed defaecation syndrome. *Altomare DF, Spazzafumo L, Rinaldi M, Dodi G, Ghiselli R, Piloni V. Colorectal Dis. 2007 Apr 18; epub.* A disease-specific index to quantify severity to allow assessment of the results of treatment in clinical trials was validated studying 76 patients with obstructed defaecation syndrome (ODS) and 30 healthy controls. The ODS score was the sum of all points with a maximum possible of 31 points. Agreement between two operators, coefficient of repeatability, internal consistency were all evaluated. There was a significant difference between the mean ODS score for patients and controls and cluster analysis on each clinical finding showed a different profile between cluster 1 (a nonhomogenous group including rectocoele, intussusception or perineal descent), and cluster 2 (pelvic dysynergia). The ODS score offers a validated severity of disease index in grading the severity of disease and monitoring the efficacy of therapy.

6 – INCONTINENCES

Burch colposuspension versus fascial sling to reduce urinary stress incontinence. *Albo ME, Richter HE, Brubaker L et al.N Engl J Med. 2007;356:2143-55.* Among many procedures available for urinary stress incontinence, few randomized clinical trials provide a basis for treatment recommendations. This multicenter randomized trial compares the pubovaginal sling with autologous rectus fascia (n 326) and the Burch colposuspension (n 329) in women with positive stress test and urethral hypermobility, the primary outcomes being negative pad test, no urinary incontinence in a 3-day diary, negative cough and Valsalva stress test. At 24 months success rates were higher for women who underwent the sling procedure, however they had more urinary tract infections, difficulty voiding, and postoperative urge incontinence.

Current and future trends in the management of overactive bladder. *Wagg A, Majumdar A, Toozs-Hobson P et al. Int Urogynecol J Pelvic Floor Dysfunct. 2007;18:81-94.* Overactive bladder (frequency-urgency syndrome) is the commonest bladder problem in late life, affecting up to 41% of over-75-year-old individuals, and the elderly experience more severe disease. The current state and future developments in pharmacological therapy are outlined.

Surgical treatment of stress urinary incontinence using the tension-free vaginal tape-obturator system (TVT-O) technique. *Jakimiuk AJ, Maciejewski T, Fritz A et al. Eur J Obstet Gynecol Reprod Biol. 2007 Apr 25;epub.* TVT-O surgery was performed in 35 patients followed up for 12 months: total cure was achieved in 42.8%, significant improvement in 17.1%, SUI symptoms abated in 11.4%, no improvement in 20%, and QoL deteriorated in 8.7%. Additional patients should be analysed for a longer period of time.

Re: Reevaluating occult stress incontinence. *Twiss C, Triaca V, Raz S. Eur Urol. 2007;51:850-1. Gastroenterol Clin North Am. 2007;36:145-59.*

The relationships among measures of incontinence severity in women undergoing surgery for stress urinary incontinence. *Albo M, Wruck L, Baker J, Brubaker L et al. J Urol. 2007;177:1810-4.* Urinary incontinence severity measures correlate moderately with each other at best. While medical, epidemiological and social aspects of aging demonstrated stronger correlations with the other measures of severity and quality of life, Valsalva leak point pressure did not. Supine empty bladder stress test did not demonstrate a clinically significant association among severity measures.

The effect of surgery on quality of life in patients with faecal incontinence of obstetric origin. *Pla-Marti V, Moro-Valdezate D, Alos-Company R et al. Colorectal Dis. 2007;9:90-5.* Surgical treatment of faecal incontinence of obstetric origin achieves good results in a high percentage of patients and has a positive effect on their quality of life. The existence of prolonged preoperative pudendal nerve motor latency indicates a poor prognosis.

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Original article

Posterior IVS for vault suspension: A re-evaluation

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Abstract: A series of patients who underwent a posterior IVS (PIVS) procedure between 1998 and 2003 using either a nylon or multifilament polypropylene sling were reviewed in 2006. Analysis of the outcomes of these patients, in some cases up to seven years after surgery has led to a reassessment of this procedure. The PIVS is an effective posterior vaginal wall fascial support procedure (De Lancey Level 2) but is less effective as an apical support, and is completely ineffective in preventing cystocoele.

Key words: Vault prolapse; Posterior intravaginal sling; Complications; Tape rejection; Recurrent prolapse.

INTRODUCTION

The PIVS was originally described by Petros as a vault suspension procedure. It was presented as an alternative to the sacrospinous fixation, transabdominal sacropexy and McCull culdoplasty.[1] As a day surgery procedure it had the potential to be used in a number of patients with medical conditions that made traditional surgery seem too risky to consider routinely. Within a short time of initial reports of this procedure focus shifted to the problems associated with the multifilament nature of the IVS tape (Tyco Healthcare, USA) and the impact of the novel surgical approach was diminished by this controversy.[2] Outcome data is presented of 127 patients who underwent follow-up after a PIVS using the original device.

MATERIALS AND METHODS

Patients who underwent a posterior IVS procedure for severe or recurrent vault prolapse between 1998 and 2003 were included in this study. All surgery was performed by the author and a detailed physical examination and clinical history was recorded. All patients had undergone a hysterectomy and had clinically evident vault prolapse (grades 2 or 3). Grade 2 vault prolapse was defined as prolapse extending to or almost to the introitus; grade 3 vault prolapse was defined as extending beyond the introitus. These assessments were made at the time of operation as the POPQ system was not available at that time. The surgical technique has been described in 2002 when outcomes of the first 93 patients were reported.[3] In summary, a transverse upper full thickness vaginal skin incision was made 1.5 cm below the vaginal vault scar. Rectal examination was performed to identify the limits of the enterocoele or rectocoele. Bilateral perineal incisions were made 2 cm lateral and below the external anal sphincter at 4 and 8 o'clock. The IVS tunneller (Tyco Healthcare, USA) was placed into the ischiorectal fossa for a distance of 4 cm before being turned inwards and upwards to reach the transverse vaginal incision. Rectal examination excluded any rectal injury and the procedure was repeated on the other side. The tape was secured to the vaginal vault and also to the remnants of the uterosacral ligaments using 00 Maxon sutures. The transverse vaginal skin incision was then closed with 00 Polysorb sutures. All patients were operated by the one surgeon. Coexisting fascial repairs were performed using a bridging technique originally described by Zacharin [4] and subsequently modified by Petros [1] and Farnsworth.[3]

Data were collected prospectively as part of an ongoing audit process and Quality Assurance program. In 2003 Ethics Committee approval was given to publish these data subject to assurances given with respect to preserving patient confidentiality.

RESULTS

One hundred and twenty seven patients underwent a posterior intravaginal sling between 1998 and 2003 using either a nylon tape or a multifilament polypropylene tape (Tyco Healthcare, USA). Patient characteristics are listed in Table 1.

Objective success of the PIVS procedure for recurrent vault prolapse was 66% at 5 years. All apical failures presented within 2 years of surgery but the incidence of cystocoele increased with time. Twenty patients (17%) went on to have a suburethral sling procedure for stress incontinence. Ninety six patients (80%) reported a high satisfaction with the procedure.

DISCUSSION

The PIVS was first described as an apical attachment procedure.[1] It was minimally invasive and had a significant impact on irritative bladder symptoms as it restored posterior support to the bladder base.[3] The original technique [1, 2] has been modified during the course of this study to improve safety and to try to minimise tape related complications. Rectal trauma occurred in only two patients, during the initial learning curve of the procedure. This risk was virtually eliminated by opening the pararectal space from the vault and placing a proximal digit on the upper surface of the levator muscle during needle insertion. The IVS needle could then be passed up from the ischiorectal fossa under finger tip control while at the same time protecting the rectum by retracting it medially.

TABLE 1. – *Patient Characteristics*.

Patient age	Median 67 (Range 36-85)
Follow Up	Median 3.9 years (Range 2-7)
Lost to follow-up	6 patients
Previous Repair	127 patients
Previous hysterectomy	127 patients

TABLE 2. – *Tape used in posterior IVS procedure*.

Nylon Tape	49 patients
Multifilament polypropylene tape	78 patients

During the initial phase of this study Dr. Farnsworth was acting as a consultant and preceptor to Tyco Healthcare, USA. This study received no external funding. Conflicting interests: None.

TABLE 3. – *Outcomes*.

Apical failure	14 patients	(11.67%)
Cystocoele	27 patients	(22.5%)
Rectal trauma	2 patients	(1.6 %)
Pudendal or inferior haemorrhoidal artery damage	0 patients	
Nerve injury	0 patients	
Ischiorectal abscess nylon tape	0 patients	
Mesh extrusion nylon tape at 2 years	5 patients	(10%)
Mesh extrusion nylon tape at 6 years	5 patients	(10%)
Ischiorectal abscess multifilament polypropylene tape	3 patients	
Mesh extrusion multifilament polypropylenetape at 2 years	2 patients	(3%)
Mesh extrusion multifilament polypropylene tape at 6 years	8 patients	(11%)
Clinical Infection of prosthesis	17 patients	(14%)
Clinical tape rejection	9 patients	(7.5%)
Post operative haematoma	5 patients	(4%)
Blood transfusion	0 patients	

Other technique refinements were developed to minimise the risk of tape related complications. These included observation of strict aseptic technique, meticulous haemostasis, covering antibiotics, skin incisions perpendicular to the direction of the tape, double layer closure of the fascia, ensuring that the tape is placed in position without any twist or folds and avoidance of any postoperative constipation, vomiting or activity that could dislodge the tape.

The PIVS is usually performed with a fascial repair. This could involve a traditional colporrhaphy, bridge repair, focal defect repair, biological prosthesis or mesh. A number of mesh prostheses based on the original posterior IVS are now available in the marketplace. Some surgeons have advocated passage of the posterior vaginal sling through the sacrospinous ligament in an effort to improve the degree of apical fixation. This technique has been incorporated into the Posterior Prolift device.[5]

As an isolated procedure the PIVS does not satisfy the criteria that David Nichols defined as the requirements of a successful vault prolapse repair.[6] These are the need for an axial repair, the conservation of vaginal form and function and the requirement to repair coexistent cystocele, rectocele and enterocele. While the author now believes that the PIVS or "translevator sling" is unlikely to be adequate as an apical or level 1 procedure I do not believe that this failing is best solved by passing the sling through the sacrospinous ligament. Rather, the PIVS is a level 2 fascial attachment and can best be used to pull the posterior fornix downwards and posteriorly into the sacral concavity to restore the posterior vaginal fornix, and create extra vaginal length so as to reduce the risk of dyspareunia. A separate apical attachment using independent permanent non absorbable sutures can be placed on the posterior and medial end of the sacrospinous ligament on each side.

Increased vaginal length, restoration of the vaginal axis and recreation of the posterior fornix is achieved by placing a more medial and posterior apical attachment in combination with a PIVS. The effect of this approach is shown in Figures 1 and 2.

Problems with tape rejection and infection were evident from early in the history of the posterior intravaginal sling and led to the change from a nylon to a polypropylene tape in 1999 and subsequently the introduction of a monofilament tape in 2006. The availability of low density wide weave macroporous slings have made the new variations of the PIVS more popular than the original.

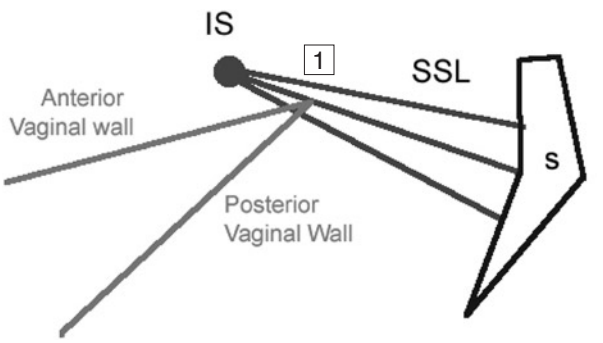

Fig. 1. – Standard sacrospinous attachment. IS = ischial spine, SSL = sacrospinous ligament, S = sacrum. The sacrospinous attachment (Position 1) is at the lateral end of the ligament.

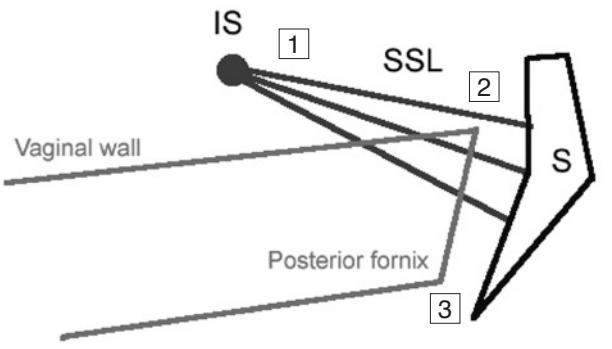

Fig. 2. – Medial sacrospinous attachment with posterior intravaginal sling restores vaginal axis and length. IS = ischial spine, SSL = sacrospinous ligament, S = sacrum. The apical attachment is independently secured at Position 2 which is much more medial and posterior than the standard sacrospinous attachment at Position 1. The PIVS at position 3 fixes the vaginal vault down and backwards into the sacral concavity.

CONCLUSIONS

Early experiences with the PIVS procedure revealed that it was ineffective as a focal apical support using either the original nylon or multifilament polypropylene tapes. Surgeons have attempted to overcome this inadequacy by placing the sling through the sacrospinous ligament or by adding an additional independent Level 1 attachment. Using a posterior vaginal sling as an apical support by passing it through the lateral end of the sacrospinous ligament can cause loss of the vaginal axis and possible shortening of the vagina.

Cumulative rates of infection or rejection have led to the abandonment by most surgeons of the original multifilament polypropylene IVS tape. A number of new monofilament tapes are now available.

The Posterior IVS is an excellent Level 2 fascial attachment. It is effective in restoring vaginal axis, length and shape. It does not prevent cystocoele and it is prone to failure leading to apical recurrence of prolapse, when used in isolation.

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Clinical practice

Short-IPGH system for assessment of pelvic floor disease

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Abstract: A simple clinical tool is presented to quantify and record pelvic floor disease. The short-IPGH system enables the clinician to document a summary of the clinical status of a patient. This system creates a clinical record with the details of a complex history and examination. It is particularly helpful when reviewing a previous assessment or reporting a patient's status to a colleague. The short-IPGH is made up of four domains which cover the basics of a pelvic floor evaluation. The data is recorded in a standard proforma which enables rapid assessment of the clinical situation. The original IPGH system was designed to process a large amount of objective data in a research environment. The short-IPGH breaks down complex data sets to create a smaller number of scoring systems that are clinically useful in everyday practice.

Key words: Pelvic floor; Clinical record; Prolapse; Incontinence; Retention.

INTRODUCTION

When assessing pelvic floor problems, clinicians should make a balanced evaluation of any dysfunction which takes into account all three pelvic compartments in addition to any general medical conditions including the consequences of neurological disease. A number of systems have been devised to analyse, diagnose and quantify pelvic dysfunction. Universally, these systems are comprehensive in their attention to detail but are usually confined to one or two functional parameters or body compartments. Pelvic floor problems are often complex and can involve multiple systems, leading to the collection of large amounts of data. While helpful as a research tool, the collation and interpretation of this data is impossible in everyday clinical practice.

The IPGH system was developed in Italy and first published in 1996.[1] It is a complex tool which is designed to take a global view of pelvic floor dysfunction and to enable the clinician to quantify the problem at hand and then verify the success or failure of any intervention. The IPGH was originally designed to be used to organise data collected in medical research. In contrast, the short-IPGH is designed specifically to be used as a tool in everyday practice. The original system is based on existing validated and partially validated classification systems. In the anterior compartment there has been a lot of work to develop standardised terminology.[2, 3] The POPQ System [4] has been advocated to quantify prolapse whilst the Wexner scales [5] are popular systems for grading rectal dysfunction. Where possible, we have tried to adopt standard methods of assessment into the short-IPGH but this is not always feasible as the final system must be equally accessible and able to be interpreted by different groups of clinicians.

The short-IPGH is a practical tool for any clinician working in pelvic medicine or surgery. This modified system is designed to take the normal detailed assessment made by the pelviperineologist, whether he or she is a urologist, geriatrician or other specialist and then summarise the findings in a standardised multidisciplinary format. It can be used to track the progress of a particular patient without needing to review each detailed clinical assessment and it can be used to record and then present the summary of a patient to a colleague.

Each clinician has the freedom to decide what specific tools he or she will use to make an assessment of a particular parameter but then the results need to be quantified and recorded using the short-IPGH format. In some areas where there is a definite established system, the international standard will be used e.g., the POPQ ordinal system for staging genital prolapse. Pain is assessed using a Visual Analogue Scale (1-10). Clinicians who use the Wexner or similar scales for assessing rectal function can extrapolate the results to give a score between 1 and 4.

METHODS

In the original IPGH system information is presented as a table which can be completed by the physician using a detailed data collection sheet or entered directly into a computerised algorithm.[6, 7]

The short-IPGH enables the clinician to summarise and record clinical data in a standardised format. Like the original IPGH system the short-IPGH comprises four domains where "I" represents Incontinence, "P" Pelvic floor and Prolapse, "G" General factors and "H" Handicap. The assessment can then be recorded on a four-section table (Tab. 1).

SECTION 1: INCONTINENCE

Data sets used in the assessment of incontinence are listed with a detailed explanation of each parameter in Table 2.

TABLE 1. – *The short-IPGH system.*

I	Ui = 0–3 Uid = yrs ur = 0–3 Uiy = 0–1 Uir = n pd = n Uiqol = 0–3 Fi = 0–3 Fid = yrs Fiy = 0–1 Fir = n Fiqol = 0–3
P	V Vd = yrs a = 0–4 p = 0–4 s = 0–4 e = 0–4 Vr = n Vqol = 0–3 L = 0–3 Ru=0–3 Rud = yrs Rur = n Ruqol = 0–3
	A Ad = yrs h = 0–4 m = 0–4 r = 0–4 ed = 0–4 rc = 0–2 Ar = n Aqol = 0–3 C = 0–3 Cd = yrs Cr = n Cqol = 0-3
	Gn = 0–1 x = 0–1 Py = 0-1 PCT = 0-3 Prel = 0–2
G	G = 0-3 Men = 0–3 Mob = 0–3 S = N/0–3
H	H = max qol (0–3) P_{VAS} = 0–10 D = n

A series of unique abbreviations are used to record the data in each of these sections.

TABLE 2. – *Incontinence*.

I	Ui = 0–3	Uid = yrs	ur = 0–3	Uiy = 0–1	Uir = n	pd = n	Uiqol = 0–3
	Fi = 0–3	Fid = yrs	Fiy = 0–1	Fir = n	Fiqol = 0–3		

A detailed explanation of each section of the chart is provided in Table 3.

Example: A 63 yr woman Para 3 Gravida 3, has a 10-year history of severe stress urinary incontinence with no urgency. The incontinence has a significant impact on quality of life, using 3 incontinence pads each day. She has failed physiotherapy and has undergone 3 incontinence procedures to try and correct the problem. This patient also had mild faecal incontinence for 1 year with minimal impact on quality of life (Tab. 4).

SECTION 2: PELVIC FLOOR/PROLAPSE

Pelvic floor and Prolapse (P) is divided into three sections. Pelvic floor and Prolapse also includes vaginal (V) and anorectal (A) sections. Each assessment for genital prolapse is recorded as Stage 1, 2, 3 or 4 where the stages of prolapse are equivalent to POPQ ordinal system stages. Anorectal prolapse is also quantified using a 4-stage description. It is a more dynamic description which also takes into account irreducibility of the involved viscera. An examination of the Genitalia (Gn) is recorded together with hysterectomy (x), previous conservative therapy (Py) and pelvic muscle function (PCT, Prel) (Tab. 5).

Detailed descriptions of the components of this assessment are listed in Table 6.

Example: An example of a prolapse assessment is shown below (Tab. 7). This patient has a Stage 2 cystocoele but no posterior, superior or vaginal Pouch of Douglas prolapse (enterocoele). The vaginal prolapse has been evident for 3 years. This is a recurrent prolapse and

TABLE 3. – *Detailed components of incontinence assessment*.

I	Incontinence
Ui	Urinary incontinence graded 0–3: where 0 = absent, 1 = light (occasional, no protection), 2 = moderate (need for protection) and 3 = severe (continuous).
Uid	Urinary incontinence duration Duration in years
ur	Urgency Graded 0 = absent, 1 = mild, 2 = moderate, 3 = severe
Uiy	Previous conservative therapy for urinary incontinence Uiy = 0 or 1 where 0 = no 1 = yes
Uir	Recurrent urinary incontinence Uir = n where n is the number of previous operations for urinary incontinence
pd	Pad usage Number of incontinence pads used each day (average)
Uiqol	Impact of urinary incontinence on quality of life 0 = no impact, 1 = minimal or occasional impact, 2 = moderate impact and 3 = severe impact on qol
Fi	Faecal incontinence graded 0–3: where 0 = absent, 1 = light (occasional, no need for protection), 2 = moderate (need for protection) and 3 = severe (continuous)
Fid	Faecal incontinence duration Duration in years
Fiy	Previous conservative therapy for faecal incontinence Fiy = 0 or 1 where 0 = no 1 = yes
Fir	Recurrent faecal incontinence Fir = n where n is the number of previous operations for faecal incontinence
Fiqol	Impact of Faecal incontinence on quality of life 0 = no impact, 1 = minimal or occasional impact, 2 = moderate impact and 3 = severe impact on qol.

TABLE 4. – *Sample incontinence record 63 yr Para 3 Gravida 3*.

I	Ui3	Uid10	ur0	Uiy1	Uir3	pd3	Uiqol3	Fi1	Fid1	Fiy1	Fir0	Fiqol1

TABLE 5. – *Prolapse Assessment*.

P	V	Vd = years	a = 0–4	p = 0–4	s = 0–4	e = 0–4				
		Vr = n	Vqol = 0–3	L = 0–3	Ru = 0–3	Rud = yrs	Rur = n	Ruqol = 0–3		
	A	Ad = years	h = 0–4	m = 0–4	r = 0–4	ed = 0–4	rc = 0–2	Ar = n	Aqol = 0–3	
		C = 0–3	Cd = yrs	Cr = n	Cqol = 0–3					
	Gn = 0–1	x = 0–1	Py = 0–1	PCT = 0–3	Prel = 0–2					

TABLE 6. – *Components of prolapse assessment*.

P	Prolapse
V	Vaginal prolapse
Vd	Duration of vaginal prolapse years
a	Anterior (cystocoele) Stage 0 = absent, Stage 1–4 = POPQ 1–4
p	Posterior colpocoele (recto vaginal septum) Stage
	0 = absent, Stage 1–4 = POPQ 1–4 *Note: This is the clinical appearance of a posterior vaginal wall bulge, due to a defect in the rectovaginal septum. The presence or abscence of a rectocele is a clinical diagnosis made by performing a digital rectal examination and is recorded in the anorectal section below.*
s	Superior (vault/uterus) Stage 0 = absent, Stage 1–4 = POPQ 1–4
e	Enterocoele (small bowel into vagina) Stage 0 = absent, Stage 1–4 = POPQ 1–4
Vr	Recurrent vaginal prolapse Vr = n where n is the number of previous operations for vaginal prolapse
Vqol	Vaginal prolapse impact on quality of life Grade 0 = absent, 1 = mild, 2 = moderate, 3 = severe
L	Latent urinary incontinence 0 = absent, 1 = appears when straining with full bladder or 2 = after the reduction of any genital prolapse, 3 = both 1 and 2
Ru	Retention of urine Ru = 0–3 where 0 = nil, 1 = minimal problem, 2 = difficult start of micturition / use of abdominal pressure / incomplete voiding, 3 = complete retention and/or need for catheterisation
Rud	Retention of urine Duration in years
Rur	Retention of urine Previous surgery n = number of procedures
Ruqol	Retention of urine impact on quality of life Grade 0 = absent, 1 = mild, 2 = moderate, 3 = severe
A	Anorectal prolapse
Ad	Duration of anorectal prolapse years
h	Haemorrhoids 0 = absent, 1 = internal, 2 = reduce spontaneously, 3 = reduce manually, 4 = irreducible
m	Rectal mucosal prolapse 0 = absent, 1 = internal, 2 = reduce spontaneously, 3 = reduce manually, 4 = irreducible
r	Rectal full thickness prolapse 0 = absent, 1 = internal (intussusception), 2 = reduce spontaneously, 3 = reduce manually, 4 = irreducible
ed	Edrocele Stage 0 = absent, 1 = internal, 2 = reduce spontaneously, 3 = reduce manually, 4 = irreducible
rc	Rectocele Stage
	0 = absent, 1 = low rectocoele involving the perineal body only, 2 = high rectocoele, involving the rectovaginal septum. *Note: rectocele is defined as a herniation of the rectum above the anal canal. It is diagnosed clinically from the rectum wheras the clinical diagnosis of vaginal posterior prolapse or colpocoele is reported above (A p) and (Ae). A high rectocoele must be distinguished from a low rectocoele in combination with an enterocoele.*
Ar	Recurrent anorectal prolapse Ar = n where n is the number of previous operations for anorectal prolapse
Aqol	Anorectal prolapse impact on quality of life Grade 0 = absent, 1 = mild, 2 = moderate, 3 = severe
C	Constipation (unsatisfactory defaecation with retention of stools) 0 = absent, 1 = mild constipation, 2 = moderate constipation, 3 = severe, 4= very severe. *Note: In the absence of an objective tool the assessment of constipation simply becomes another measure of quality of life. We recommend the use of the Wexner score*[6, 7] *to provide an objective measurement tool (Appendix 2).* *Wexner score 0–5 = mild, 6–11 = moderate, 11–15 = severe, 16–30 very severe*
Cd	Duration of constipation Years
Cr	Previous surgery for constipation Cr = n where n is the number of previous operations for constipation
Cqol	Constipation impact on quality of life Grade 0 = absent, 1 = mild, 2 = moderate, 3 = severe
Gn	External genitalia 0 = normal, 1 = abnormal
x	Hysterectomy x = 0 or 1 where 0 = no, 1 = yes
Py	Previous conservative therapy for prolapse Py = 0 or 1 where 0 = no, 1 = yes
PCT	Pubococcygeus contraction test Patient is asked to squeeze on two fingers placed in the vagina or one finger in the anus to assess PC strength 0 = no contraction, 1 = minimal contraction, 2 = weak contraction, 3 = strong contraction
Prel	Pelvic floor muscle relaxation at straining Prel = 0–2 where 0 = pelvic relaxation, 1 = no relaxation, 2 = paradox contraction

TABLE 7. – *Example of prolapse assessment.*

P	Vd3	a2	p0	s0	e0	Vr3	Vqol2	L0	Ru3	Rud4	Rur = 0	Ruqol3
	Ad0	h0	m0	r0	ed0	rc1	Ar0	Aqol0	C2	Cd6	Cr0	Cqol2
	Gn0	x0	Py1	PCT2	Prel0							

there have been three previous vaginal repair operations. The effect of the prolapse on the patient's quality of life is moderate, but the patient has severe urinary retention requiring self catheterisation and severely affecting her quality of life. There is no posterior colpocoele, no haemorrhoids, no mucosal prolapse and no previous surgery for anorectal prolapse. There is however a small rectocoele extending into the perineum associated with a degree of constipation which has been present for 5 years and is also affecting quality of life. There has been no previous surgery for constipation. External genitalia are normal. She has not had a hysterectomy but has undergone unsuccessful pelvic rehabilitation treatment. She has weak pelvic muscle contraction. There is good relaxation of the pelvic floor.

SECTION 3: GENERAL HEALTH FACTORS

G records the general health of the patient where 0 = no health problems, 1 = minimal health problems, 2 = significant health problems, 3 = severe health problems.

Level 3 medical conditions are defined as those diagnoses that pose an immediate and significant threat to the patient. Level 3 problems include stroke, heart attack, pulmonary embolus, other cardiac disease or previous thromboembolic disease. They require a comprehensive pre-operative medical and anaesthetic workup.

Level 2 diagnoses are medical problems that are unlikely to increase morbidity and mortality if anticipated prior to surgery. Any potential risk is reduced by precautionary medical treatment. Level 2 problems might include diabetes, treated cancer, peripheral vascular disease or inflammatory bowel disease. Level 2 medical conditions require a preoperative anaesthetic consultation.

Level 1 diagnoses represent a small or insignificant risk and do not require any special intervention.

Men (mental function) is measured on a scale of 0–3 where 0 = normal, 1 = slight impairment, 2 = moderate impairment and 3 = severe impairment. Mob (Mobility) is graded using a similar scale.

S relates to sexual function. N = not active or interested, 0 = normal function, 1 = minor irritation or problems, 2 = moderate sexual dysfunction, 3 = severe sexual dysfunction.

Sexual function is included in the general domain so as to emphasise the variety of factors which can affect sexuality beyond physical problems in the pelvic floor.

TABLE 8. – *General Health.*

G	G = 0–3	Men = 0–3	Mob = 0–3	S = N/0–3

Example: The patient presented below has minimal general health problems, mild mental problems such as depression, and good mobility. She is not sexually active.

TABLE 9. – *Example of general health assessment.*

G	G1	Men1	Mob0	S N

SECTION 4: HANDICAP INCLUDING PAIN

The handicap (H) defines the severity of the patient's specific disability due to the symptoms of pelvic floor disease and is represented by the maximum quality of life score recorded in any part of the short-IPGH record. Pain is assessed on a scale of 0-10 using a visual analogue scale. The doctor index (D) is the number of doctors (n) that the patient has consulted for pelvic floor problems.[9, 10, 11]

TABLE 10. – *Handicap and pain assessment.*

H	H = max qol	Pn	VAS = 0–10	D = n

Example: The patient below has seen two doctors for her current problems and has severe pelvic pain. The maximum QOL recorded elsewhere in her assessment is 2.

TABLE 11. – *Example of handicap and pain assessment.*

H	H2	Pn8	D2

CASE REPORT

In order to further understand the Short-IPGH system in clinical practice a case report is presented : 65y Para 2 Gravida 1.

I	Ui3	Uid2	ur3	Uiy1	Uir1	pd4	Uiqol3	Fi1	Fid1	Fiy0	Fir0	Fiqol1
P	Vd5	a3	p0	s1	e0	Vr0	Vqol2	L0	Ru2	Rud3	Rur0	Ruqol2
	Ad0	h0	m 0	r0	ed0	rc0	Ar0	Aqol0	C0	Cd0	Cr0	Cqol0
	Gn0	x1	Py0	PCT1	Prel0							
G	G2	Men0	Mob2	S2								
H	H3	Pn0	D2									

This 65-year-old woman has been pregnant twice but delivered only once. She reports severe urinary incontinence for 2 years with severe urgency in association with a Grade 3 cystocoele which has been present for 5 years. She uses 4 pads each day and has undergone unsuccessful pelvic floor rehabilitation as well as one previous incontinence procedure. The problem is causing a severe impact on her QOL. Mild faecal incontinence has been present for 1 year. She has had no previous surgery for this condition. It is only having a minimal effect on her QOL. Moderate urinary retention has been present for 3 years and is causing moderate impact on quality life. Examination reveals a Stage 3 cystocoele, no posterior defect, slight uterine prolapse but no enterocoele. She has undergone a previous hysterectomy but no previous prolapse surgery. There is a moderate effect on QOL due to the cystocoele.

In the posterior compartment there was no evidence of haemorrhoids, mucosal prolapse, rectocoele, or edrocoele. There have been no previous surgical procedures for anorectal prolapse and the quality of life associated with rectal prolapse is normal. There is no constipation. External genitalia examination is normal. The PC muscle function test shows mild weakness. Pelvic muscle relaxation is normal. This patient has some health issues of significance such as diabetes or hypertension. Her mental state is normal but her mobility is moderately impaired. She is still sexually active but with moderate problems. Handicap

assessment reveals her maximum QOL is 3. She has seen two doctors regarding her current pelvic floor problems and at present does not complain of any pain.

DISCUSSION

The short-IPGH allows a large amount of clinical information to be presented in a short format. The changes from the original IPGH system have been made to make it easier to record the data and easier to remember the various components of each assessment. Different specialists have different understandings of similar terminology, or different terminologies for the same conditions. Colorectal surgeons and gynaecologists are speaking about different things when they talk about a rectocoele. The short-IPGH is a first step along the path of developing a common language at the basic clinical level to enable the information about a patient to be recorded in a standardised way. It has to be emphasised, however, that this system is dependent on the quality of the information obtained. It does not pretend to be an objective instrument of measurement, as each component of the assessment is subjective unless obtained through validated tests. The short-IPGH may prove to be an important step in eventually developing a common data set and choosing a set of clinical tools that objectively record important information.

Our experience has shown that completion of this proforma at the conclusion of taking a history and examination provides an excellent summary of the patient in the medical record. This simple process highlights the salient points of the history and is available as a starting point for the next clinical visit. It avoids having to scan the entire history of a patient to try and remember the important issues and it is much more sensible to record the details of the patient's history into the short-IPGH proforma (Appendix 1) when the information is still fresh in the doctor's mind.

CONCLUSIONS

The short-IPGH presented here is a compromise. It is not intended to upset any clinician by appearing to reduce the importance of the detailed analysis of the particular area of history or examination that he or she likes to record. This system is put forward as a practical attempt to develop a common multidisciplinary terminology and enable clinicians to compare patient data and understand each other's assessment. Studies are now underway to validate the short-IPGH system in the context of a multidisciplinary pelvic floor clinic.

APPENDIX 1. – *Short IPGH proforma.*

Patient ID

Address

DOB Date of Examination

I	Ui FI	Uid Fid	ur	Uiy Fir	Uir Fiqol	pd	Uiqol					
P	Vd Ad	a h Gn	p m	s r x	e ed Py	Vr rc PCT	Vqol Ar Prel	L Aqol	Ru C	Rud Cd	Rur Cr	Ruqol Cqol
G	G	Men	Mob	S								
H	H	Pn	D									

APPENDIX 2. – *Grading of constipation.*[6, 7]

number of defecations per week	0–4
obstruction/straining/anal pain	0–4
incomplete defecation	0–4
abdominal discomfort/pain/bloating	0–4
time (min) spent in toilet	0–4
help for defecation: laxatives, suppositories	0–1
help for defecation: enemas, digitations	0–2
unfruitful attempts	0–4
how many years	0–4

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Original article

Clinical and functional results after tailored surgery for rectovaginal fistula

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Abstract: Forty patients were treated for recto-vaginal fistula between 1988 and 2005. Thirty-five patients underwent surgery (sphincteroplasty=12, fistulectomy and layered closure=10, advancement flap=5, diversion only=2, coloanal=2, fistulotomy=1, omentoplasty=1, ileal resection=1, Martius graft=1). Of the 33 patients who underwent fistula repair 25 (76%) healed. Two patients healed after a second procedure, therefore final healing occurred in 27 (82%). Preoperative incontinence improved in 5/7 (71%) patients while 4/32 (12%) patients developed postoperative incontinence. There was no predictor of healing or incontinence. Choice of the appropriate treatment with selective use of sphincters and levators for reconstruction of the rectovaginal septum are likely to be relevant for successful outcome.

Key words: Recto-vaginal fistula; Sphincteroplasty; Fistulectomy; Advancement flap.

INTRODUCTION

Recto-vaginal fistulae (RVF) are complex fistulae particularly difficult to treat. Their frequency is relatively low, representing less then 5% of anorectal fistulae.[1] Obstetric injury is by far the most frequently reported cause of low recto-vaginal fistulae.[2-5]

The outcome after surgery for RVF has been correlated with aetiology, complexity of disease, sphincter function and prior attempts to repair.[6] The type of operation to correct the fistula may be a fistulotomy or an endorectal advancement flap (EAF) in case of simple fistulae.[7] Often, to repair concomitant sphincter defects or to interpose vascularized tissue a sphincteroplasty or a muscle flap is needed.[8] More rarely transabdominal resection with an omentoplasty or a coloanal anastomosis is required.[9]

Because of the diversity of the approach the majority of articles found in the literature deal with a single procedure and often do not include results on anal continence. The aim of the present study was to evaluate the outcome of surgery after a variety of procedures, assessing both healing of the fistula and anal continence.

MATERIALS AND METHODS

We reviewed the charts of 40 consecutive patients with RVF seen in our Coloproctology Unit between 1988 and 2004. Median age was 43 (range 27-87) . Fistula aetiology is outlined in table 1. The height of the fistula in the recto-vaginal septum was low in 24 cases, middle in 15 and high in 1 case. Twenty-six fistulae (65%) were complex according to the Rothemberger classification.[6]

Five patients (13%) had undergone 7 prior attempts at RVF repair (advancement flap=1; fistulotomy=2; fistulectomy and closure=4). Four other patients had undergone fistulotomy and/or drainage procedures for perianal sepsis. Six patients had previously undergone a sphincteroplasty, which was performed because of incontinence in 5 cases and to repair a RVF in one.

Preoperative manometry was available in 17 (42%) patients to measure resting tone and squeeze pressure in the anal canal as well as rectal capacity (sensation at onset of stimulus, call for stool and maximal urgency). Preoperative manometry was performed using water filled catheters connected via pressure transducers to a polygraph (Medtronic. Milan, Italy). Low manometric pressure was defined as a resting pressure of less then 50mmHg or a squeeze pressure of less then 110 mmHg. Rectal volumes were calculated with an air filled balloon and were defined as low if an urge sensation was present with less then 60 cc of air. Anal and vaginal ultrasonography was available in 12 patients (30%). Anal ultrasound (AUS) was carried out using a 7 mHz rotating probe filled with degassed water and attached to an ultrasound machine (BK Medical. Ahrens, Denmark). Both sphincter muscles and fistula tract were examined. If an opening was identified with anoscopy or vaginoscopy, hydrogen peroxide was injected to highlight fistula tract.

Five patients did not undergo surgery. One because of patient's choice, one because of minimal symptoms and three because fistula healed after medical therapy. Thirty five patients (87%) underwent surgery (Tab. 2). Sphincteroplasty, always combined with levatorplasty, was performed through a perineal incision as described by Corman.[10] Indications for sphincteroplasty were incontinence (n=4), prior sphincteroplasty as cause of fistula (n=3), occult tear on AUS (n=2) and need of vascularized tissue (n=3). EAF was performed using a flap of rectal mucosa and part of the smooth muscle layer as described by Rothemberger et al.[7] Fistulectomy with layered closure was performed transanally with non-overlapping reabsorbable sutures. A transanal or transvaginal levatorplasty was performed in 4/10 fistulectomies and 1/5 EAF. In one patient with RVF from a sphincteroplasty a flap of bulbocavernous muscle (Martius graft) was interposed between rectum and vagina. One patient (3%) with radiation proctitis underwent permanent diversion. Of the remaining 34 patients 8 (25%) underwent temporary diversion prior to or at time of surgery (sphincteroplasty=5; EAF after failed repair=1; coloanal=2). Perioperative intravenous broad spectrum antibiotics were used in all cases.

TABLE 1. – *Fistula Etiology.*

Etiology	*number*	*(%)*
Obstetric	8	(20)
Unknown	8	(20)
Bartholin's cyst	5	(13)
Crohns	6	(15)
Criptoglandular	3	(7)
Radiotheraphy	3	(7)
Sphincteroplasty	3	(7)
Ulcerative Colitis	2	(5)
STARR*	1	(3)
Hysterectomy	1	(3)

* Stapled transanal rectal resection.

TABLE 2. – *Surgical procedures in 35 operated patients.*

Procedure	*number*	*(%)*
Sphyncteroplasty	12	(34)
Layered closure	10	(28)
EAF*	5	(14)
Colectomy and coloanal	2	(6)
Omentoplasty	1	(3)
Permanent diversion	1	(3)
Temporary diversion only	1	(3)
Fistulotomy	1	(3)
Ileal resection	1	(3)
Martius flap	1	(3)

* Endorectal advancement flap.

Mean follow up was 42 months (median 18; range 1-120). Treatment endpoints were fistula healing and anal continence. Anal continence was evaluated using a validated classification (Tab. 3) which takes into account both severity and frequency of symptoms.[11] Variables examined are listed in table 4. Statistical analysis was done using two sided Fisher's exact test and a two tailed t test.

RESULTS

Fistula recurrence

Treatment outcome is outlined in figure 1. Three of 5 medically treated patients healed their fistula (IBD=2; Bartholin=1). One patient with radiation proctitis underwent permanent diversion, and one patient completely healed after temporary diversion. If we exclude the patient with permanent diversion surgery was successful in 25/34 (73%). One patient with Crohn's disease healed her fistula after ileal resection. Of the 33 patients who underwent fistula repair healing occurred after first surgery in 25 (76%). Mean time to recurrence was 4 weeks (median 3 weeks; range 1-42 weeks). Five of the 8 patients with recurrent RVF underwent a second surgery (Fig. 1). Of them, one patient underwent redo sphincteroplasty, 3 patients underwent fistulotomy of residual fistula tracts and one required faecal diversion after dehiscence of sphincteroplasty and declined further treatment. Ultimately 27 of 33 patients (82%) who underwent fistula repair had their fistula healed at last follow-up visit.

TABLE 3. – *Pescatori's classification of anal incontinence.*

Type of incontinence	*Frequency of episodes*
A = incontinence to mucus or flatus	1 = sporadic
B = Incontinence to liquids	2 = often
C = Incontinence to solids	3 = always

There were no statistically significant predictors of fistula recurrence after the first surgery. After including the results of second surgery 12/12 patients (100%) after sphincteroplasty healed versus 11/15 (73%) patients treated with either layered closure or advancement flap, but this did not reach statistical significance.

Anal continence

Seven patients (14%) had anal incontinence at time of referral. Postoperative continence in relation to preoperative continence is outlined in figure 2. Of the 7 patients who were incontinent before surgery 5 improved (3 after sphincteroplasty, 1 after fistulectomy and closure, 1 after EAF and levatorplasty), 1 remained incontinent (after sphincteroplasty) and one was still diverted at last follow up

TABLE 4. – *Variables examined in statistical analysis.*

Age
Fistula height
Fistula complexity
Etiology
Type of surgery
Prior RVF surgery
Prior anorectal surgery
Interposition of vascularized tissue*
Concomitant levatorplasty
Temporary diversion
Preoperative continence score
Postoperative continence score
Low manometric pressure
Low rectal volume
TRUS sphincter defects

* External sphincter, levator ani, bulbocavernous muscle

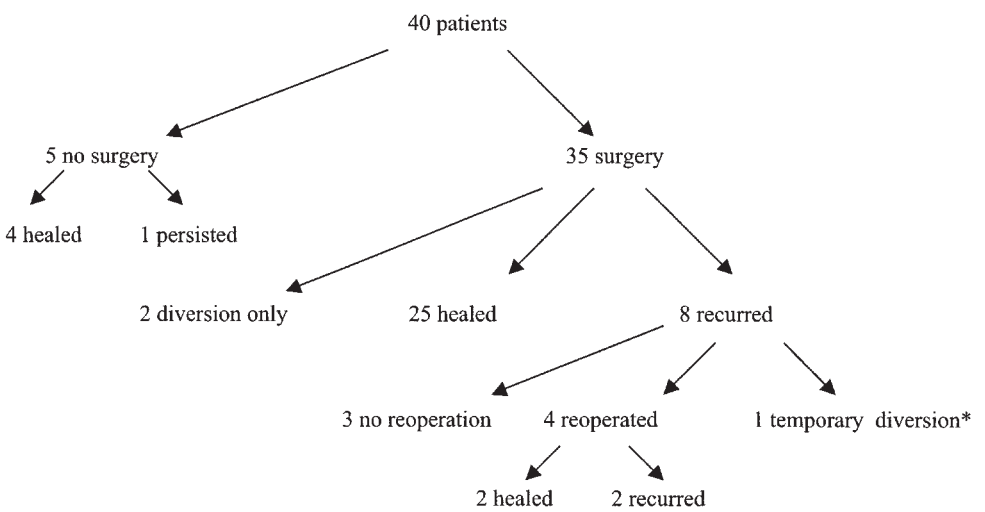

Fig. 1. – Treatment and outcome. - *Legend:* Treatment outcome in 40 patients with recto-vaginal fisula. * Refused further surgery.

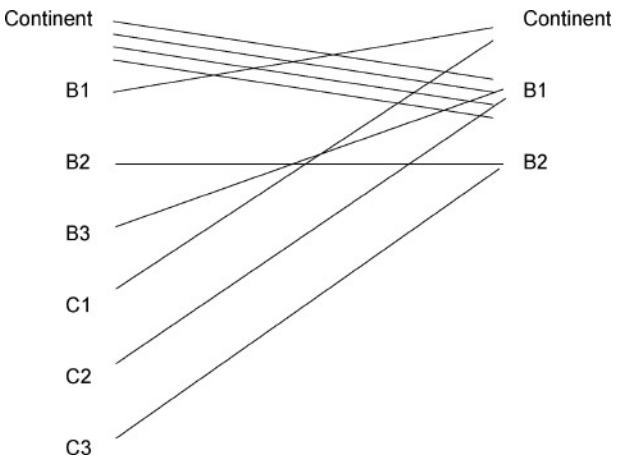

Fig. 2. – Pre and postoperative classification of incontinence. - *Legend:* Alteration of continence after RVF surgery. Patients with fecal diversion were excluded.

visit. Minor postoperative incontinence developed in 4 patients (sphincteroplasty=2; fistulectomy=1; coloanal=1). There were no statistically significant predictors of postoperative continence.

Manometry and Ultrasonography

Manometry results were available in 17 patients. Low squeeze pressure were recorded in 7 patients, five of whom had no symptoms of faecal incontinence. In some of these continent patients low pressures were felt to be secondary to pain caused by the RVF. Low rectal volume was recorded in 3 cases. Because of reduced rectal volume one patient underwent permanent diversion instead of a reconstructive procedure.

AUS correctly identified the fistula tract in 8/12 cases (66%) including 3/4 cases (75%) of occult fistula, and identified associated sphincter defects in 4/12 cases including 2 asymptomatic patients with obstetric trauma. Both of these patients underwent a sphincteroplasty based on ultrasonograhic findings.

Postoperative Complications

Complications are listed in Table 5. One patient died because of small bowel obstruction and perforation at time of colostomy reversal. Suture dehiscence occurred after sphincteroplasty in 3 cases and after fistulectomy and layered closure in one. This complication required operative revision in one case, temporary diversion in one case and minor outpatient revisions in 2 cases.

DISCUSSION

The present series reflects the practice of a specialized coloproctology unit. Twenty-six of 40 fistulae (65%) were complex and 16/40 (40%) patients had already undergone perineal procedures for sepsis, incontinence and obstructed defecation. In this patients population we achieved a healing rate of 81% with fistula repair. Presence of scar tissue from previous procedures has been correlated with worse outcome by other authors [8,12] but not in the present series. The use of vascularized flaps in 17/29 (59%) perineal procedures may in part explain these result.

TABLE 5. – *Postoperative complications*.

Complication	*number*	*(%)*
Death	1	(2)
Suture dehiscence	4	10)
Perianal fiustula	1	(2)

Complications within one month of surgery in 35 operated patients.

The role of fecal diversion is controversial. While its use is of unproven benefit some authors advocate routine temporary diversion for anastomotic RVF and fistulae secondary to radiation injury.[13] Serious consideration should be given to diversion after large advancement flaps and after a complicated sphincteroplasty.[9] In our series temporary diversion was selectively used in RVF after prior sphincteroplasty, after a failed attempt to RVF repair and in both cases of coloanal procedure. Even if it is impossible to prove its benefits, it is likely that this has contributed to our high healing rate in these difficult patients. Temporary diversion is not without complications, as testified by one postoperative death after colostomy reversal. We therefore recommend to be extremely selective with temporary diversion and to limit its use to the cases with severe tissue inflammation and poorly vascularized tissue in which slow healing is expected.

One hundred % of patients undergoing sphincteroplasty were free of fistula at time of last follow-up compared with 73% of patients undergoing either layered closure or advancement flap, although this did not reach statistical significance. Other studies failed to report an advantage between sphincteroplasty and layered closure or EAF.[7, 14, 15] Nevertheless it is important to know that in complicated cases of RVF with sphincter involvement excellent results may be achieved by interposing sphincter muscle between rectum and vagina. Five of 13 patients (38%) underwent transvaginal or transperineal levatorplasty in addiction to layered closure or EAF. Performing a levatorplasty in addition to a sphincteroplasty increases the chances of success from 33% to 96% according to Tsang et al.[16] This was done routinely in our patients. Adding a levatorplasty to a fistulectomy di not significantly improve healing or continence, but numbers are too small to draw conclusions.

Performing a preoperative AUS allowed us to identify cases of occult sphincter defect. The importance of selecting patients who may benefit from sphincter repair using preoperative AUS has been previously reported [17] and cannot be overemphasized. AUS also helped to guide the surgeon in 3 of 4 cases with occult fistula tract. Our results compare with the literature where identification of fistula tract by AUS is possible in 28% to 96% of cases.[18-20] Sensitivity may be increased by injecting hydrogen peroxide into the tract [21] as in the present series.

We are reporting that measurement of squeeze pressure at manometry may yield false positive results secondary to perineal pain which may be experienced by the patient asked to squeeze during sphincter assessment. Nevertheless volume measurements with manometry helped us identifying a case with reduced rectal capacity in whom a reconstructive procedure would achieve poor functional results. We therefore suggest that both EUS and manometry are routinely performed before attempting RVF repair through either a perineal or an abdominal approach.

Interestingly, half of the cases of RVF secondary to IBD were treated non-operatively and 2 cases were treated through an abdominal approach (colectomy and coloanal=1; ileal resection=1). Healing occurred with medical treatment only (n=2), after a sphincteroplasty (n=1) and in both cases treated through an abdominal approach. High failure rates after attempts to RVF repair are thought to be due to proximal disease and to poorly vascularized chronically inflamed tissue.[22-25] Recently high failure rates after EAF in Crohn's disease have been reported as well as improved results when

proximal bowel resection was simultaneously performed.[26] Our results seem to confirm these findings. Healing of RVF secondary to IBD after medical treatment is thought to be rare.[27] Our finding that 2/4 (50%) healed while medically treated emphasizes that surgical approach in these patients needs to be very selective and that no attempt to local repair should be undertaken in the presence of local or proximal inflammation.

Fistula closure was always prefomed transanally. The transvaginal approach is routinely used by gynecologists but does not abide by the principle that the repair should be on the high-pressure side, namely the rectum, and thus is not favoured by colorectal surgeons. However no prospective comparison of transanal vs tranvaginal repair can be found in the literature.

In conclusion RVF are associated with a variety of conditions to be taken into account for the treatment to be successful. Thorough preoperative anatomical and functional assessment and elimination of all active inflammations are key to succeed. In the present retrospective study we did not find any approach to be superior. The overall healing rate after sphincteroplasty was 100%. Sphincter reconstruction was achieved without difficulty since 80% of these patients had prior sphincter surgery and 50% underwent a diverting stoma . Therefore no single procedure is likely to prove successful in all cases and flexibility in tailoring surgical approach to this variety of factors is required.

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Clinical audit

Comparison of transobturator sling procedures for genuine stress urinary incontinence in the short to medium term

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Abstract: This report is a retrospective audit that compares the use of 3 different slings to treat stress incontinence using the transobturator approach in the hands of a single surgeon. There is a highly significant reduction in incontinence in all patients undergoing a transoburator sling. There was no difference in the short term and medium outcomes by objective and subjective assessment. The most common complication noted was urgency incontinence.

Key words: Plastination; Stress incontinence; Transobturator; Outcomes; Complications.

INTRODUCTION

The suburethral sling has become the main operation for the surgical management of stress urinary incontinence in women. The transobturator approach for sling placement has gained popularity and the technique and variety of commercially available materials has been well covered in the literature.[1] The effect on quality of life is also well documented.[2] Complications with the use of multifilament mesh in terms of mesh erosion have been reported [3, 4] but the use of monofilament or biological material has significantly decreased this problem. The availability of a variety of materials allows the surgeon a choice.[5] Does it really matter which sling is used? This report is a short to medium term audit of the outcomes of patients who underwent a transobturator sling using a variety of materials but with all operations performed by the same surgeon.

MATERIALS AND METHODS

One hundred and thirty four patients who had genuine stress incontinence diagnosed by urodynamic studies underwent pre and post operative 1 hour pad tests, and ICS QOL questionnaire. A medium term retrospective audit was performed of all patients by telephone or email for subjective review. The transobturator approach was used on all patients and the procedures were performed by the same surgeon between May 2004 and March 2007 using one of the three available slings. All the operations were performed as day stay surgery except when concurrent other gynaecological surgery was required or other risk factors required overnight observation. All procedures were performed under general anaesthesia and all patients had cystoscopy performed after tape placement. The short term follow up on all patients was 6 weeks and the average medium term follow up was 22 months. Three types of sling were used. The Johnson and Johnson TVT Obturator System using polypropylene mesh (n=13), the AMS Monarc™ Transobturator polypropylene mesh (n=57) and the Bard Pelvicol™ Porcine mesh Transobturator placement (n=64). Objective data from the pre and post op pad tests were analysed using PH Stat and the t Test for differences in 2 means. The subjective data was converted to a digital scale and analysed in a similar fashion. All patients received peri-operative antibiotics.

RESULTS

Of the 134 patients with genuine stress urinary incontinence, a Transobturator sling was performed in all using one of three methods as described. Sixteen percent of patients underwent a concurrent other gynaecological procedure as well. These included in order of frequency, pelvic floor repair, hysterectomy and sacrospinous colpopexy. The median age was 56 years (range 35-86, mean 56). The age distribution was similar for all groups. The objective results and the subjective results showed a very high degree of correlation. An assessment of the entire group showed that there was a marked improvement from the pre-operative state to the postoperative one both for the short and medium results and in both objective and subjective scores ($p < .001$, 95% CI). Assessing the results of the three groups separately, the Monarc™ and the Pelvicol™ groups had similar excellent results ($p < .001$, 95% CI). The TVT-Obturator™ also had excellent results but this was a smaller group ($p = .002$, 95% CI). When any one method was compared with another there was found to be no significant difference in any one over the other. The most common short term complication was the de novo appearance of urgency and urgency incontinence. This occurred in 12 patients or 9% of the group. This symptom occurred with equal frequency across the three groups. In all cases the urgency had disappeared or was much better by medium term follow up. There were 5 cases of urinary tract infection post operatively making an overall rate of 3.7%. There were no erosions noted at short term follow up and no symptoms to suggest this as a problem at medium term. Patients did not undergo an examination at the medium term follow up.

DISCUSSION

Transobturator sling placement is a very successful procedure for the treatment of genuine stress urinary incontinence. The short to medium term results using both objective and subjective measures confirms its value in the modern management of stress incontinence. It has a low complication rate and is quick and easy to perform. This retrospective audit includes all cases performed by one surgeon and allows the opportunity to compare three different Transobturator operations. It is clear that the results of the three procedures described above all give the same results when assessed in the short to medium term. From this perspective then it does not matter which procedure is used. They are all equally good. Long term follow up may however show some discriminating features.

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Competing interests: None

EDITORIAL COMMENT

This paper is valuable because it reports the clinical outcomes of a series of all patients referred to and then operated by an experienced pelvic surgeon. We are constantly subjected to opinions regarding the validity of different sling materials and claims by manufacturers or champions of various products. Retrospective review of a group of patients such as this eliminates the bias and variations in surgeon experience that may affect the results of more formal controlled trials involving carefully selected groups of patients.

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Pelvic Floor Digest

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Early results of immediate repair of obstetric third-degree tears: 65% are completely asymptomatic despite persistent sphincter defects in 61%. *Hayes J, Shatari T, Toozs-Hobson P et al. Colorectal Dis. 2007;9:332-6.* A total of 121 women who had immediate repair of obstetric third-degree tears underwent interview, anal ultrasonography and anorectal physiology. Residual defects in the sphincters were associated with a significantly higher incidence of abnormal resting and squeeze anal pressures. Anal manometry had no correlation with symptoms. The highest proportion of severe incontinence was in those with internal anal sphincter (IAS) defect alone and when there was a residual IAS and external anal sphincter (EAS) defect. Only 5% with intact sphincters had severe incontinence and only 18% with a residual EAS defect alone had severe incontinence. These results indicate a good outcome following immediate repair of third-degree obstetric tears and emphasize the role of the IAS in continence.

Faecal incontinence in male patients. *Kim T, Chae G, Chung SS et al. Colorectal Dis. 2007 May 10; e pub.* In a total of 404 males the most common prior diagnosis in patients <70 years of age (group A) was perianal sepsis and symptomatic haemorrhoids; in patients >/=70 years (group B) it was prostate cancer, symptomatic haemorrhoids and neurological diseases. The most common prior procedure in group A was restorative proctectomy/proctocolectomy, fistulotomy or haemorrhoidectomy. In group B radiation therapy for prostate cancer and haemorrhoidectomy.

7 – PAIN

Symptoms suggestive of chronic pelvic pain syndrome in an urban population: prevalence and associations with lower urinary tract symptoms and erectile function. *Marszalek M, Wehrberger C, Hochreiter W et al. J Urol. 2007;177:1815-9.* The prevalence of symptoms suggestive of chronic pelvic pain syndrome in a cohort of 1,765 men with a mean age of 46.3 years participating in a health screening project was 2.7% and it revealed no age dependence. Chronic pelvic pain syndrome has a negative impact on erectile function.

The mast cell in interstitial cystitis: role in pathophysiology and pathogenesis. *Sant GR, Kempuraj D, Marchand JE, Theoharides TC. Urology. 2007;69(4 Suppl):S34-40.* Identifying the patients with interstitial cystitis who have mast cell proliferation and activation, enables to address this aspect of disease pathophysiology, and with targeted pharmacotherapy to inhibit mast cell activation and mediator release.

The role of the urinary epithelium in the pathogenesis of interstitial cystitis/prostatitis/urethritis. *Parsons CL. Urology. 2007;69(4 Suppl):S9-S16.* The urothelium plays a pivotal role as a barrier between urine and the underlying bladder. The biologic activity of bladder surface mucus that imparts this barrier function is generated by the highly anionic polysaccharide components (eg, glycosaminoglycans), which are extremely hydrophilic and trap water at the outer layer of the umbrella cell. This trapped water forms a barrier. The result is a highly impermeable urothelium. In interstitial cystitis (IC), disruption of the urothelial barrier may initiate a cascade of events in the bladder, leading to symptoms and disease. Heparinoids can restore the barrier function and treat IC. Groups of patients who have been given a diagnosis of IC, chronic prostatitis, and urethritis have been shown to have IC by virtue of their shared potassium sensitivity. A name such as lower urinary dysfunctional epithelium would incorporate all of these diseases under a single pathophysiologic process.

Bladder defense molecules, urothelial differentiation, urinary biomarkers, and interstitial cystitis. *Hurst RE, Moldwin RM, Mulholland SG. Urology. 2007;69 (4 Suppl):S17-23.* Interstitial cystitis involves an aberrant differentiation program in the bladder urothelium that leads to altered synthesis of several proteoglycans, cell adhesion and tight junction proteins, and bacterial defense molecules such as GP51. These findings lend support to the rationale for glycosaminoglycan replacement therapy.

Effect of test order on sensitivity in vulvodynia. *Reed BD, Sen A, Gracely RH. J Reprod Med. 2007;52:199-206.* The order of testing at vulvar and peripheral sites (thumb) has little impact on the results of pressure-responsive sensitivity testing among women with and without vulvodynia.

Thermal and visceral hypersensitivity in irritable bowel syndrome patients with and without fibromyalgia. *Moshiree B, Price DD, Robinson ME et al. Clin J Pain. 2007;23:323-330.* Irritable bowel syndrome (IBS) is a chronic gastrointestinal disorder with visceral and somatic hyperalgesia, producing a similar effect seen with the central hypersensitivity mechanism in fibromyalgia (FM). FM+IBS patients show greater thermal hypersensitivity compared with IBS patients. However IBS patients exhibit higher pain ratings to rectal distension compared with FM+IBS patients. This data suggests that regions of primary and secondary hyperalgesia are dependent on the primary pain complaint.

Increased colonic pain sensitivity in irritable bowel syndrome is the result of an increased tendency to report pain rather than increased neurosensory sensitivity. *Dorn SD, Palsson OS, Thiwan SI et al. Gut. 2007 May 4; epub.*

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Expert opinion

Bowel dysfunction in spinal cord injury patients: pathophysiology and management

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Summary: Digestive function is one of the greatest problems for people with spinal cord injuries, particularly control of evacuation. The term "neurogenic bowel" is an indication of the belief that bladder emptying and evacuation of the rectal contents are thought to be similar. There are many important differences between the two functions that make the respective pathophysiological mechanisms underlying the symptoms quite different. Firstly, the muscular wall of the bladder does not contain a complex neuronal network. Secondly, the contents of the bladder are liquid while bowel contents can range from liquid to solid. It is impossible to explain variations in the transport of intraluminal contents based on a single pathophysiological model such as hyporeflexia/hyperreflexia or reduced/increased rectal wall compliance. In spinal cord injury patients intestinal transport of intraluminal contents through the colon is increased and the lesion level is not predictive of the motor activity of the large bowel. It is misleading to talk about the diagnosis and treatment of voiding and evacuation as if they behave in similar ways due to a neurological lesion.

Key words: Spinal cord injury; Visceral disorders; Neurogenic bowel; Bowel management.

INTRODUCTION

Digestive function is one of the greatest problems for people with spinal cord injuries, particularly control of evacuation. Bowel disorders play an important part in the course of rehabilitation following spinal injury, in terms of both quality of life[1,2] and morbidity and mortality.[3,4] In a recent study in a large population of Italian patients with spinal cord injury (SCI) (993 subjects), 23% said they were not satisfied with their bowel management: more than half the sample said that it was a heavy burden on their social life and more than a third complained that they had not managed to achieve regular bowel function, that they were embarrassed and that they were not self-sufficient in managing their bowels.[5]

The approach to bowel problems in these patients has been developed from the approach used to study the bladder and voiding. The term "neurogenic bowel" is an indication of the belief that the two functions of bladder emptying and evacuation of the rectal contents are similar. However, there are many important differences between the two functions that make the respective pathophysiological mechanisms underlying the symptoms quite different, and the authors therefore feel that for a better clinical understanding, both conditions should be kept quite separate and the differences pointed out, rather than looking for similarities. The most important difference between the gastrointestinal tract and the bladder is the fact that the muscular wall of the bladder does not contain a complex neuronal network of the type that runs along the whole length of the gastrointestinal tract. The detrusor muscle and ureteral sphincters contract or relax in response to extrinsic nerve stimuli induced by reflexes and modulated by the central nervous system (CNS). However, it is well-known that the enteric nervous system is autonomous of both the CNS and autonomic nervous system, sufficiently so to be referred to as "the second brain", and the contractile activity of the bowel wall muscles is not dependent on extrinsic stimuli; co-ordinated motility is preserved in the bowel even when the latter is completely denervated.[6] A second important difference between the physiology of bladder emptying and that of rectal emptying is the way in which both organs are filled. First there is the consistency of the contents: the contents of the bladder are invariably liquid, while faeces can be anything from semi-liquid to decidedly solid, with variations even within the same material evacuated in the same defecation. In addition, urine flows into the bladder almost continuously, while there is considerable variation both in the intervals between times when the rectum is filled, and how long this takes (it should be remembered that the rectum is physiologically empty except during defecation). Normal bowel physiology is characterised by extreme variability and can be influenced by a number of factors. It is not surprising that the presence of any pathology in the rectum can result in even more variation in bowel function. If the rectum is inflamed and sensitive then it will react differently and may empty precipitantly in response to the arrival of small volumes of material from the left colon and minimal distension of the rectal walls. For these different reasons, the pathophysiological mechanisms underlying voiding and defecation disorders cannot be the same or similar, either in relation to excessive retention, or incontinence. One consideration will illustrate this general point: the majority of patients with complete SCI that has caused a total sensory and motor deficit of the anorectal region, do not experience seepage or unexpected evacuation. This is mainly because at the same time, the consistency of the faeces in these patients is increased, a fact that tends to prevent the material leaking; so faecal retention occurs even though the mechanisms of continence are completely absent. This phenomenon is not possible for the bladder; if sphincter tone is completely absent, even if there is no detrusor contraction, leakage of urine and incontinence occur.

In addition to water, the faecal volume consists of bacteria that "detach themselves" from the enormous amount of microflora present in the colon. In fact, more than 70% of the dry weight of faeces consists of bacteria, mostly living.[7] The remainder consists mainly of a matrix of undigested polysaccharides. The right colon contains a real "metabolic organ" formed from a biomass of bacteria, three times more numerous than the eukaryotic cells that make up our organism, formed from 400 different types of bacterial species which are the source of the bacteria eliminated as faeces, and which also have innumerable metabolic functions, including some that are able to significantly influence regulation of the motility of the colon in which they live.[8, 9]

Thus, for all these reasons it seems misleading to continue to discuss the pathophysiology and, especially, diagnosis

and treatment of voiding and evacuation as if they behaved in similar ways as a direct consequence of the characteristics (level, completeness, etc.) of the neurological lesion of the central or peripheral nervous system. Rather than the term "neurogenic bowel", we will use the more accurate "bowel dysfunction", which is also more appropriate because impaired epithelial permeability, contractility and perception of abdominal organs are also present in those patients who have no particular intestinal disorders.

ABNORMALITIES OF COLORECTAL MOTILITY AND THEIR CLINICAL CONSEQUENCES

In 1984, Glick and co-authors published a study that demonstrated that the so-called "gastrocolonic reflex", now more appropriately called the "colonic response to food" was no longer present after a thoracic spinal cord injury.[10] Recently, a group of American researchers demonstrated in eight SCI patients (three tetraplegics and five paraplegics, with lesion levels between C5 and T10) that the motor activity of the colon increased after ingestion of a meal of 880 kcal. This motor response involved only the descending colon and started from significantly lower levels of contractility than those of normal subjects.[11] So it seems certain that, after spinal cord injury, there is a reduction in both baseline colon motility and motility after stimulation, although the hypomotility does not uniformly affect all segments of the colon and is not related to the level or completeness of the injury. Consequently, the effects on transport of the intraluminal contents cannot be restricted to a single pathophysiological model such as hyporeflex-hyperreflex or reduced-increased wall compliance. Bowel transit studies confirm that the transit time of intraluminal contents through the colon is increased; in particular, transit time always increases in the transverse colon and descending colon, while in the other segments, increased transit time is related either to lesion level or to distance from the lesion event. A significant increase in transit in the rectosigmoid colon is in fact seen only in the case of lesions below the conus medullaris, while in the ascending colon it is seen only in the early stages after injury.[12,13] The fact that the lesion level is not predictive of the motor behaviour of the large bowel is also confirmed by our recent observations that demonstrated identical behaviours in tetraplegic and paraplegic patients, or more diverse behaviours within the same group.[14,15] In particular we found low rectal compliance in patients with both complete and incomplete cervical and thoracic lesions.[16]

It is thought generally that complications secondary to bowel dysfunction do not have the same impact in terms of severity and frequency as those resulting from bladder malfunction. In fact, many complications are caused by the faecal retention resulting from reduced frequency of evacuation, and especially by poor or incomplete evacuation yhat results in large amounts of residual material after evacuation. In fact, bowel dysfunction leads to many complications, Table 1 shows those that have been reported, with their respective references to the literature, but, in our judgement, improved knowledge of the pathophysiology and more refined diagnostic processes will result in an increase in the number of complications, showing that they have a completely secondary role in the clinical course of spinal cord injury.

In our opinion, there is already sufficient clinical evidence to classify as one of the most common and important complications in terms of clinical outcome, the manifestation of systemic inflammatory response syndrome (SIRS) caused specifically by faecal retention in the bowel from massive overgrowth of the bowel microbiota, as a consequence of the dysmotility, altered epithelial permeability, and ingestion of drugs, that characterise the early stages after spinal cord injury.

Table 1: – *Complications of fecal impaction in patients with spinal ccord injury.*

VOLVULUS	Longo WE, 1990[17] Binard JE 1992[18]
PARALYTIC ILEUS	Nino-Murcia M 1990[19]
STERCORAL PERFORATION	Banwell JG 1993[20]
AUTONOMIC DYSREFLEXIA	Cosman BC 1991[21] Stone JM 1990[22]
DYSPNOEA	Stone JM 1990[22]
WORSENING OF SPASTICITY	Aisen ML 1992[23]

Systemic inflammatory response syndrome (SIRS) is defined as the first stage of septic disorders, followed by sepsis, severe sepsis, septic shock, organ dysfunction associated with severe sepsis and septic shock, and finally multiple organ dysfunction syndrome (MODS), in accordance with the definitions and classification of the American College of Chest Physicians and the Society of Critical Care Medicine.[24] SIRS can be diagnosed when two or more of the following four criteria are present: axillary temperature > 38° or < 36°; leukocyte count > 2,000/mm^3 or < 4000mm^3; heart rate > 90 beats/minute; respiration > 20/min or $PaCO_2$ < 32 mmHg.

To our knowledge no studies have clearly defined the relationship between faecal impaction, retention of faeces in the colon and the origin of the clinical manifestations that can be ascribed to SIRS, but they are very frequently observed in spinal units and in wards with acute patients. Moreover, there are many reasons to support such a relationship, including our knowledge of the incidence of bacterial overgrowth that occurs in the bowel of patients in intensive care in general, and in SCI patients in particular; and there is also the presence of epithelial hyperpermeability in these patients and the possibility of translocation that may be activated by disruption of the balance of intestinal bacterial flora. There are therefore strong arguments to support the theory that many cases of SIRS observed during the early stages after spinal cord injury are not the result of unrecognised foci of infection, but are rather caused by contamination and overgrowth of bowel microflora following motor dysfunction and incomplete bowel emptying.

A recent study in a population of patients with severe constipation who did not have motor neurological injuries demonstrated that many indicators of a systemic inflammatory response were present and that robust therapy with laxatives restored these indicators to normal. In particular, coinciding with poor evacuation there was a rise in the population of CD+3, CD+4 and CD+25 lymphocytes; there were also increases in serum albumin and in antibodies against *Streptococcus aureus* and *Escherichia coli*, with a simultaneous reduction in CD+27 and B-lymphocyte counts. Finally, there was a reduction in faecal concentration of bifid and lactic acid bacteria. Taken together, all these factors indicate that constipation disrupts the balance of the bacterial flora resident in the colon, with overgrowth of certain strains leading to activation of the systemic immunological control systems. All these values returned to normal after treatment with laxatives and the consequent resolution of faecal retention.[25] The suggestion that SIRS in patients with SCI may be related to faecal impaction is still a working hypothesis, but certainly these data offer strong support for it.

ASPECTS OF THERAPY

The objectives of treatment of constipation should be to:

- allow the formation of a faecal mass of adequate volume and consistency;
- encourage the mixing of the intraluminal contents by regularising the 24-hour segmental contractile activity of the colon;
- stimulate the onset of propulsive motility;
- achieve suitable rectal filling to trigger the mechanisms of evacuation;
- promote complete evacuation avoiding post-defaecation residual faeces.

As stated previously, we do not have enough knowledge of the pathophysiological mechanisms to know how to achieve these effects in an SCI patient. However, there is certainly evidence and rational arguments for using substances such as Macrogol, prebiotics and probiotics in order to achieve these objectives, including in subjects with CNS lesions. The strategy we propose for a gradual approach to treating constipation is described below.

Step 1: *balancing the diet, with a return to normal relationships between fats, proteins and carbohydrates; wide range of foods consumed and the way they are prepared; incorporation of calories and with particular nutrients to correct any deficiencies or malnutrition; administration of prebiotics and dietary fibre; weaning from oral laxatives; scheduling of evacuation with Dulcolax suppositories (or suppositories for evacuation, if sufficient) every two to three days with the patient on the toilet, and not lying on their side in bed.*

If these measures do not succeed in achieving satisfactory rectal evacuation, either in terms of comfort and acceptability for the patient, or completeness and ensuring continence, a full gastroenterological assessment should be carried out, followed by a move to **step 2**, i.e. *using more specific and more powerful products and drugs, from Macrogol to high doses of psyllium, prokinetics, digestive enzymes and many others*[26] *in different combinations for an individualised treatment plan related to the problems found in that patient*. If this approach is also not sufficient, we move on to **step 3**, *starting the patient on transanal irrigation performed with the new Peristeen® device* (Coloplast, U.S.A.). This is a simple device consisting of a rectal catheter fitted with a balloon which, once inflated, maintains complete continence in the region of the anal sphincter. This makes it possible to infuse 800-1000 ml of water in a few minutes, using a hand pump; the pressure exerted means that it will irrigate even the proximal segments of the colon. At the end of infusion, as soon as the catheter has been removed, the increased intraluminal pressure causes the water and faeces to be evacuated. We have shown that even the contents of the right colon are evacuated after a single irrigation session with this device.[27] A multicentre study of a significant number of stabilised SCI patients, involving some of the most important spinal cord units in Europe, showed that bowel function indicators (better quality of life and reduced number of urinary infections) were better in the group treated with this method than in the control group, which was treated with traditional methods.[28]

CONCLUSION

Instruments to explore bowel function in spinal cord injury are now available in more advanced centres and in specialist spinal units, i.e. multichannel anorectal manometry, study of transit with radiopaque markers or scintigraphy, computerised barostat measurement, and dynamic radiological studies with defaecography or MR defaecography. Total colonic manometry and gastroduodenojejunal manometry are now well-established techniques by which we can discover the precise mechanisms that allow the bowel to function after a CNS lesion. Systematic use of these studies makes it possible to identify the various pathophysiological mechanisms that may cause apparently identical clinical situations. Just as in functional gastrointestinal disorders, including in SCI patients, it is important to determine the precise disorder (or disorders) causing the evacuation problems, and so to plan targeted therapy which is guided by the pathophysiology, rather than the invariably empirical therapy which is still too often given, even in the better spinal cord units.

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Pelvic Floor Digest

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8 – FISTULAE

Spontaneous closure of vesicovaginal fistulas after bladder drainage alone: review of the evidence. *Bazi T. Int Urogynecol J Pelvic Floor Dysfunct. 2007;18:329-33.* A vesicovaginal fistula may occur as a surgical complication, the result of obstructed labor, or a late manifestation of radiotherapy. Surgical treatment includes many routes and techniques, with a success rate reaching 100%. The spontaneous closure of vesicovaginal fistulae following bladder drainage alone for varying periods has been reported by many, but the factors favoring the success of this conservative method have not been well examined and no solid conclusion regarding management recommendations can be drawn.

Benign rectovaginal fistulas: management and results of a personal series. *Devesa JM, Devesa M, Velasco GR et al.Tech Coloproctol. 2007 May 25; epub.* In 46 cases surgical techniques included endorectal or vaginal advancement flaps, fistulectomy and sphincteroplasty, vaginal/rectal closure and epiploplasty, restorative proctectomy and restorative proctocolectomy. In 20 patients, a diverting stoma was performed as a single procedure or concomitant to the curative attempt. Overall 85% treated for cure healed, including all simple fistulas and 20 complex fistulas (8 iatrogenic, 3 actinic, 2 ulcerative colitis without restorative procto- colectomy; 5 pouch vaginal; 1 septic; 1 Crohn's disease).

Recto-urethral fistula following brachytherapy for localized prostate cancer. *Shakespeare D, Mitchell DM, Carey BM et al. Colorectal Dis. 2007;9:328-31.* The incidence of recto-urethral fistula (RUF) is low. RUF following prostate brachytherapy has been associated with rectal biopsy in previous series and this is confirmed in our report. Gastrointestinal specialists should not perform biopsy of the anterior rectum in patients who have had brachytherapy unless there is a very high clinical suspicion of malignancy.

Late results of treatment of anal fistulas. *Sygut A, Zajdel R, Kedzia-Budziewska R et al. Colorectal Dis. 2007;9:151-8.* The aim of this paper is to analyse the results of treatment of anal fistulas retrospectively. The complication rate was 10-fold higher in patients presenting with a recurrent fistula than in those with primary fistulas and threefold higher in patients with multi-tract fistulas than in those with single-tract fistulas.

Anal Sphincter Advancement Flap for Low Transsphincteric Anal Fistula. *Chew SS, Adams WJ. Dis Colon Rectum. 2007 Apr 27;epub.* A new technique proposes the use of the distal part of the anal sphincter as an advancement flap to cover the internal opening and thereby effect a cure.

9 – BEHAVIOUR, PSYCHOLOGY, SEXOLOGY

Interstitial cystitis and female sexual dysfunction. *Ottem DP, Carr LK, Perks AE, Lee P, Teichman JM. Urology. 2007;69:608-10.* Female patients with interstitial cystitis/painful bladder syndrome have sexual dysfunction, including pain. Female Sexual Function Index Pelvic Pain and Urgency/Frequency Questionnaire scores are considered.

Erectile dysfunction. *Wessells H, Joyce GF, Wise M, Wilt TJ. J Urol. 2007;177:1675-81.* Erectile dysfunction is self-reported by almost 1 of 5 men and it increases with age. Accurate estimates of economic cost will require better understanding of pathogenesis, treatment seeking behaviour, patient preference for therapies, success of treatments and relative satisfaction with oral pharmacotherapy and penile implants.

10 – MISCELLANEOUS

Recurrent Postoperative Perineal Hernia: Transperineal Redo Mesh Repair. *Tracy Hull, M.D., Editor. Ruiz DE, Khaikin M, Vivas D, Newman M, Wexner SD. Dis Colon Rectum. 2007 Apr 27; epub.* A technique is described of transperineal mesh repair of symptomatic perineal hernia recurrent after previous transabdominal mesh repair of the hernia developed after abdominoperineal resection.

The utility of magnetic resonance imaging for diagnosis and surgical planning before transvaginal periurethral diverticulectomy in women. *Foster RT, Amundsen CL, Webster GD. Int Urogynecol J Pelvic Floor Dysfunct. 2007;18:315-9.* The use of MR imaging allowed for accurate diagnosis and improved surgical planning: 26 women were treated with periurethral diverticulectomy, one with cystourethrectomy.

Case report

The use of triple vaginal ring pessaries in procidentia prior to total Prolift™ procedure

NADER GAD

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Abstract: A grandmultiparous (G7P5) 78 year old woman presented with total procidentia with total eversion of the vagina which was oedematous and ulcerated. She complained of dribbling of urine, urgency and urge incontinence. She was very keen on surgical repair. Vaginal packing, single and double vaginal ring pessaries had failed to reduce the procidentia preoperatively. She was fitted with three ring pessaries: size 59 mm was inserted first, then 77mm followed by 95mm. This resulted in reducing her genital prolapse which allowed the vaginal ulcers to heal before a definitive surgery by vaginal hysterectomy, and total prolift procedure was undertaken about one month later. The procedure and recovery were uncomplicated and when reviewed 7 weeks postoperatively, she was asymptomatic with excellent vaginal support.

Key words: Procidentia, Prolift; Vaginal Ring Pessary.*

INTRODUCTION

Long-standing procidentia results in venous congestion, oedema, decubitus ulcers and infection. Preoperatively, the procidentia needs to be reduced for a sufficient period of time to allow healing of these ulcers. This management decreases intra-operative bleeding and complications. It may be impossible to reduce the prolapse in some of these women if the vagina cannot retain single or double pessaries. I have used triple pessaries in the management of the case presented.

CASE REPORT

A grandmultiparous (G7P5) 78 year old woman presented to the emergency department with a very uncomfortable mass protruding out of the vagina that had been progressively increasing in size. Initially, the mass had been reducible but it had been irreducible for over a year. Concomitantly, she complained of dribbling of urine, urgency and urge incontinence. She suffered from hypertension, gout and osteoarthritis which were very well controlled by medications. On general examination she was well for her age and abdominal examination revealed no abnormality. Pelvic examination revealed a total procidentia with total eversion of the vagina which was oedematous with marked ulceration. In spite of her age and not being sexually active, she was very keen on definitive surgical repair. Different surgical options were discussed with her and she was keen on hysterectomy and total prolift procedure. She was informed that the vaginal ulcers and oedema needed to be treated before any attempt of surgical treatment. Single and double vaginal ring pessaries, as well as vaginal packing following hospital admission, all had failed to stay in to reduce the procidentia in order for the vaginal ulcers to heal prior to any surgical procedure.

A further attempt was then made, after manual reduction of the prolapse, by fitting three ring pessaries: size 59 mm was inserted first, then 77 mm followed by 95 mm (Fig. 1). The process of insertion of the three pessaries was very well tolerated by the patient and, after their insertion, she felt very comfortable and relief of her urinary symptoms with no further urine dribbling. Before she was sent home, another lengthy discussion took place about different surgical options with their pros and cons. Patient was given a date for review in 2 weeks in the outpatient clinic and also a date in about a month's time was listed for surgical correction of her prolapse by vaginal hysterectomy and total prolift. She was also advised to use oestrogen therapy in the vagina every night.

The patient attended the outpatient clinic a few days later when the rings were expelled on that morning as she strained to open her bowels. She stated that she was comfortable when the rings were in the vagina with continuous relief of the urinary symptoms that troubled her before the insertion of the triple pessaries. There was much improvement of thee vaginal ulcers and oedema since the insertion of the pessaries 3 days ago. The patient was fitted again with the same size pessaries and was advised to avoid constipation and excessive straining when opening her bowels. She was further advised to digitally support the pessaries during defaecation and to keep her appointment for review in the pre-operative clinic.

About two weeks later, she was reviewed in the preoperative clinic. The pessaries were still in place and vaginal ulcers and oedema were markedly improved (Fig. 2). The patient was offered to continue with conservative management with the triple pessaries, but she declined and was keen to go ahead with the surgery as planned.

About one month from the patient's initial presentation, she underwent vaginal hysterectomy and total prolift procedure. The vaginal ulcers were completely healed. The procedure was straightforward with minimum blood loss and the postoperative recovery was excellent. As planned, the vaginal pack that was inserted at the end of her procedure was removed on the 2nd post-operative day and the Foley's urinary catheter that was inserted at the beginning of the surgery was removed on the 4th postoperative day. As the post-void residual urine was less than 100 ml, she was then sent home on the 4th post-operative day.

Fig. 1. – The triple ring pessaries with the smaller one to be inserted first.

Fig. 2. – Total Procidentia, there was marked improvement of the vaginal ulcers and oedema after conservative management with the triple pessaries.

Fig. 3. – The patient 7 weeks following vaginal hysterectomy and total prolift procedure.

The patient was reviewed in the outpatient clinic 7 weeks postoperatively; she was asymptomatic and very pleased with the outcome of her surgery. On examination there was excellent vaginal support (Fig. 3). She was discharged from the clinic.

DISCUSSION

A survey of the pattern of gynaecologists and urogynaecologists of prescribing pessaries in the United States indicated that the ring pessary is used most often and is deemed the easiest to use.[1, 2] In a large retrospective study, 71% of patients were found suitable to be initially fitted with a pessary, but three weeks later the overall success rate was only 41%.[3]

Treatment of massive pelvic organ prolapse in elderly women is a very challenging clinical problem. Conservative management by pessaries is usually offered to women considered unfit for surgery but it is not always successful. Singh and Reid reported insertion of double vaginal ring pessaries in 18 patients, in 3 of them the rings were expelled immediately.[4] In correspondence to this publication it was suggested that for these three women a third ring pessary might have been tried.[5] In five patients with grade 4 pelvic organ prolapse in whom single pessary was unsuccessful, double pessaries (either Donut or Inflatable, followed by flexible Gelhorn or Shaatz) were successful in their management.[6] Varma & Kunde described a two-stage approach in four women with massive prolapse, two of these women tried and failed with double ring pessaries. Initially colpoperineoraphy was performed with insertion of a ring pessary followed by definitive surgery 6 weeks later.[7] It may be argued that LeFort colpocleisis is a shorter procedure and potentially has less intraoperative morbidity compared to total prolift procedure. However this procedure may result in specific long-term problems that may not appeal to some patients in spite of their age.[8] In this patient there were no intraoperative or postoperative complications with the total prolift procedure and the outcome was excellent.

CONCLUSION

A trial of insertion of triple vaginal ring pessaries is worthwhile in women with massive pelvic organ prolapse when some other measures have been tried without success. Total prolift procedure is a feasible option for surgically fit elderly patients with massive prolapse.

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