



The use of neuromuscular electrical stimulation in vaginoperineorrhaphy (rectocele repair)

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General Note



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ABSTRACT

Introduction: This study presenting experience of utilizing neuromuscular stimulation in posterior vaginal wall muscles repair to identify pelvic floor muscles defects. **Methods:** This prospective study carried at King Abdulaziz University Hospital (KAUH) and Baksh private Hospital, Jeddah, Saudi Arabia from May 2019 till June 2020. Attended 20 patients with rectocele. Patients demographic and clinical characteristics were collected. Pre-repair assessment of rectocele were recorded. Neuromuscular electrical stimulation was used intraoperatively for initial muscles defects evaluations then during dissection to identified muscles at applying stitches of repair and at repair conclusion for final vaginoperineal muscles assessment. Pain intensity, vaginal caliberation and intercourse and sexual satisfactions were evaluated. Patients were followed up post-operative. **Results:** Repair causes were sexual dissatisfaction (100%), recurrent vaginitis (85.0%), difficult defecation (75.0%), urinary incontinence (65.0%), urinary tract infections (50.0%), dyspareunia (50.0%). All patients had rectocele and cystocele, defective perineal body, 8 (40.0%) urethrocele, 4 (20.0%) abnormal vaginal mucosa. Post-procedure vaginal width, vaginal caliberation, pain scale, intercourse and sexual satisfactions improved versus pre-procedure. **Conclusions:** High beneficial of neuromuscular stimulation usage in intra-operative identifying vaginal and perineal muscles defects.

Keywords: Electrical stimulation, intercourse, neuromuscular pelvic floor muscles, pain scale, posterior vaginal wall repair, rectocele, sexual satisfaction, vaginal caliberation.

1. INTRODUCTION

The integrity of superficial and deep pelvic floor muscles (PFMs) is important in hold up pelvic organs, maintaining fecal and urinary continence and healthy sexual functions. Pelvic organ prolapse (POP) is a condition in which organs slip out of place or fall and present as a herniation or bulge of pelvic organ. POP was classified as a rectocele, enterocele, cystocele, uterine prolapse, or vault prolapse. The POP prevalence, depend upon a clinical examination, in general female population was more than 30%, while prevalence depend upon vaginal bulge symptoms ranged from 5-10% (Milsom et al., 2013). Symptomatic POP may cause discomfort, lower life quality and limits daily activities (Milsom et al., 2013). PFMs can be weakened by repeated deliveries, anorectal or genitourinary surgical interventions and with ageing, consequently cystocele, urethrocele and rectocele can develop which results in inconvenient urinary and rectal symptoms also can lead to vaginal laxity which will affect sexual function and satisfaction (Gyhagen et al., 2013).

Surgical treatment of this problem started early in 19th century and was known as posterior colporrhaphy to reconstruct perineal shreds and was including plication of pubococcygeus muscles and posterior vaginal wall, and reconstruction of perineal body (Hale and Fenner, 2016). Richardson characterized the site-specific reconstruction of different defects in rectovaginal septum, aiming for a more anatomic repair (Richardson, 1993). The nerve and muscle stimulator, also known as neuromuscular electrical stimulation (NMES), or electromyostimulation, means uses an electrical signal or impulses to produced muscle contractions. NMES used in many medical fields including identification of anorectal sphincteric mechanism during pull- through surgery of imperforate anus and other anomalies (Hasselbeck and Reingruber, 2012; Kapuller et al., 2014), identification, protection of facial nerve and its branches during parotid surgery (Guntinas-Lichius and Eisele, 2016) and in pelvic floor training for strengthening of its muscles by transvaginal and transcutaneous stimulation in cases of urinary incontinence (Kershaw et al., 2019, Rodrigues et al., 2019) but its use in identification of perineovaginal muscles in posterior repair was not used before.

This prospective study presenting the first experience of utilizing neuromuscular stimulation in vagino-perineorrhaphy in 20 patients suffering from rectocele to properly identify perineal and vaginal muscles during surgical repair to improve surgical outcome and prevent postoperative short- and long-term complications.

2. MATERIALS AND METHODS

This prospective study was carried out at King Abdulaziz University Hospital (KAUH) and Baksh private Hospital, Jeddah, Saudi Arabia from May 2019 till June 2020 at Department of Obstetrics and Gynecology. Attended in this research 20 patients, age range from 36.0-63.0 years, suffering from rectocele that fulfilled posterior vaginal wall repair indications. Excluded from the study were patients using hormonal therapy, using of pacemaker or metal rod implant, latex allergy, other allergies in pelvic region, gynecological cancers, significant pain on palpation, neurological disorders or serious illness.

Data were collected from recorded clinical evaluation preoperatively, that includes age, nationality, marital status at surgery time and after, number of waifs for the husband and number of marriages for patients and their order in waifs, marriage duration, parity, delivery mode and whether patients had episiotomy or any medical or/ and surgical history including any medical disorders that can be predisposing risk factors for POP like chronic constipation, bronchial asthma, chronic cough, liver diseases or others, also all type of genital reconstructive procedures from surgical repair to laser tightening or fillers before. Reason for requesting the repair, genito-urinary or lower gastrointestinal symptoms or sexual dissatisfaction for either or both of couples.

At baseline, each patient underwent an evaluation that included gynecological and rectovaginal examinations. All examinations were made in supine lithotomy position. Vagino-perineorrhaphy operation was done under epidural or general anesthesia without muscle relaxant, then pre-repair assessment of rectocele degree and perineal body defects including vaginal caliberation was made. Then NMES of perineal and vaginal muscles was used via perineal and intravaginal electrical stimulation with bipolar probe (Pena muscle stimulator model PS-2, Radionics) for transcutaneous and direct stimulation of perineal and vaginal muscles with adjustment of stimulation current between 60-100 milliamperes as needed to muscle responses. NMES was used intraoperatively for initial preoperative evaluation, during the dissection for identifying the muscles at applying the stiches of repair and at repair completion for final assessment of vaginoperineal muscles (Figures 1 and 2) with vaginal calibration aiming at adapting 3 cm diameter cylinder keeping in mind to discuss with patient her partner penile tumescence caliber. Vaginal calibration was done preoperative, immediate postoperative and in follow up using adopted cylindrical objects with variable diameters (2-9 cm) and measurable length (1-12cm)

to evaluate vaginal caliber. Vaginal width was scaled from 1-4, 1-from 2-3 cm ; 2-from 4-5 cm, 3 from 6-7 cm and 4 from 8-9 cm, where 2-3 cm is optimal vaginal width. Pain intensity was assessed by four- points verbal categorical rating scale. Four points categorized verbal rating scale were 0= no pain,1-10 present of pain, 1-3 mild pain, 4-6 moderate pain and from 7-10 severe pain (Breivik et al., 2008). Intercourse pain /discomfort and sexual satisfaction the only two vaginal repair relevent parameters of femal sexual function (Breivik et al., 2008) were assessed globally in the form of yes or no. Scale of intercourse and sexual satisfaction were from 1-3; where 1: yes; 2: no with reaseons; 3: not active. Reasons for inactivity were not yet married again;having pain or fear of pain.

In outpatient follow-up, the first 2 visits (1st& 3rd weeks) were to evaluate surgical wounds, any associated pain or infections and vaginal calibration. The next two follow up visits (at 6th weeks & 3rd month), patients were evaluated for wound healing, examining repair integrity, pain scale, vaginal calibration, intercourse and sexual satisfaction if sexual activities started and improvement of initial presenting symptoms.

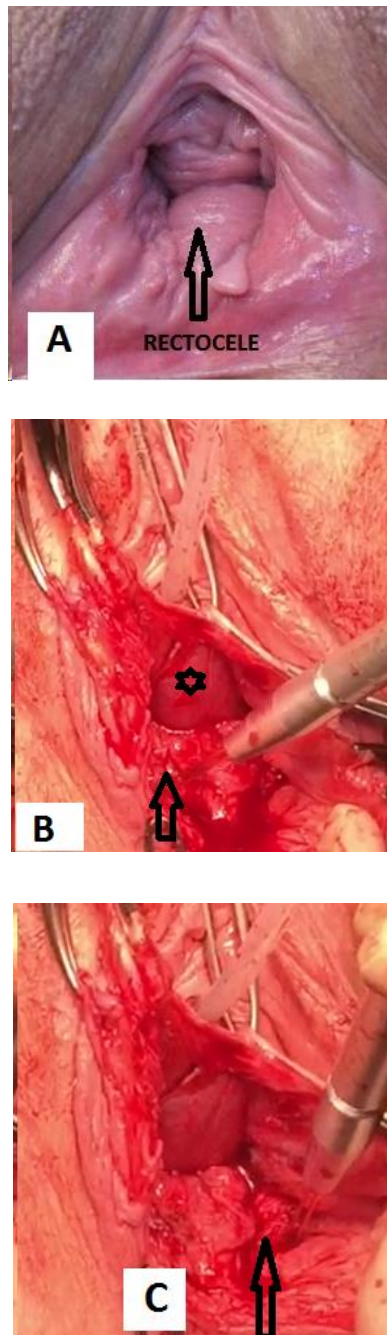


Figure 1 Posterior vaginal wall muscle identification with (NMES)

Rectocele preoperative

Intraoperative posterior vaginal muscle identification with direct muscle stimulation. Arrow and tip of stimulator on the right side sheet of posterior vaginal muscle, (*) at the defective part of the post vaginal wall.

Intraoperative posterior vaginal muscle identification with direct muscle stimulation, arrow and tip of nerve stimulator on the left side sheet of posterior vaginal muscle.

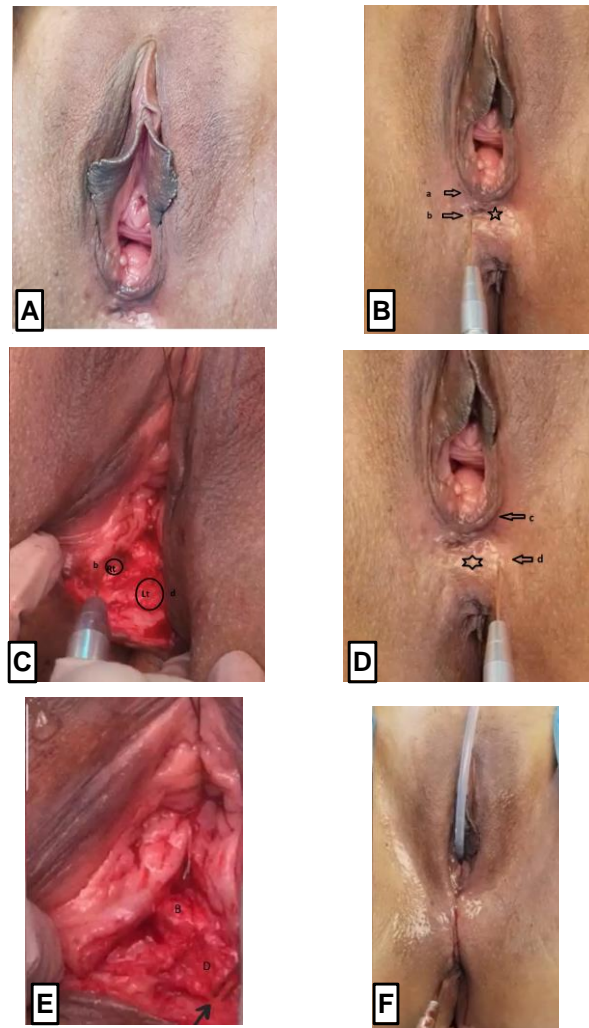


Figure 2 identification of perineal muscles with the use of (NMES) during perineorrhaphy after completion of vaginoplasty:

- A. Preoperative picture showing the rectocele with atrophic perineum
- B. Transcutaneous perineal muscle stimulation showing the site of contraction of the right muscles, (a)right bulbospongiosus ,high up in the vestibule, (b) right transverse perineal muscles, (*) very weak contraction in the central atrophic perineum.
- C. Direct muscles stimulation of the right transverse perineal muscle with small muscle bulk at lateral and higher position (b). The left muscle (good bulk) can be seen.
- D, Transcutaneous perineal muscle stimulation showing the site of contraction of the left perineal muscles (c) left bulbospongiosus high up in the vestibule, (b) left transverse perineal muscles,
- E. Direct muscles stimulation of the left transverse perineal muscle with good muscle bulk at lateral and lower position (d).
- F. Post-operative view with transcutaneous perineal muscle stimulation.

Statistical Analysis

The values were presented as mean +/- standard deviation, minimum and maximum or number (%) as appropriate and were analysed by IBM SPSS Statistics for Windows, version 23 (IBM SPSS, IBM Corp., Armonk, N.Y., USA). Shapiro – Wilk test was used to evaluate normal data distribution. Significance between Pre- and Post- procedure and between measure parameters at different

weeks was made using Person Chi-Square test and between pre- and post= procedure parameteric value using paired students "t" test.

3. RESULTS

The demographic characteristics of patients were presented in table (1). Most of participants were Saudi (90%), in age group 46-50 years (35.0%), married (90.0%), had one wife (90.0%), marriage once (95.0%) and mode of delivery was spontaneous vaginal delivery (85.0%).

Table 1 Demographic characteristics of the patients (n= 20).

Characteristics	Frequency (%)
Nationality	
Saudi	18 (90.0%)
Non- Saudi	2 (10.0%)
Age (years)	46.80±6.92 (36.0-63.0)
Age groups	
35-40 years	2 (10.0%)
41-45 years	6 (30.0%)
46-50 years	7 (35.0%)
51-55 years	3 (15.0%)
61- 65 years	2 (10.0%)
Marital status	
Married	18 (90.0%)
Divorced	2 (10.0%)
Number of wives	
One	18 (90.0%)
Two	2 (10.0%)
Number of marriage	
1 st marriage	19 (95.0%)
2 nd marriage	1 (5.0%)
Duration of marriage	
10-15 years	2 (10.0%)
16-20 years	4 (20.0%)
21-25 years	5 (25.0%)
26-30 years	3 (10.0%)
31-35 years	5 (25.0%)
40-45 years	1 (5.0%)
Parity	
1-2	1 (5.0%)
3-5	11 (55.0%)
6-7	3 (15.0%)
≥8	5 (25.0%)
Method of delivery	
SVD	17 (85.0%)
SVD+CS	3 (15.0%)
Number of episiotomy	
1	2 (10.0%)
2	3 (15.0%)
3	5 (25.0%)
4	5 (25.0%)
5	5 (25.0%)

Data are expressed as number (%) and mean+/-SD (minimum – maximum). SVD: spontaneous vaginal delivery; CS: cesarean section.

Causes of requesting repair were sexual dissatisfaction in 100% of patients, that was requested mostly by both couples (95.0%); followed by recurrent vaginitis (85.0%), difficult defecation (75.0%), urinary incontinence (65.0%), urinary tract infection (50.0%), and dyspareunia (50.0%) (Table 2). None of patients experience any of above symptoms in post operative follow up period.

Table 2 Causes of requesting repair.

Causes	Frequency (%)
Sexual dissatisfaction	20 (100.0%)
Couple request	
Wife	1 (5.0%)
Both	19 (95.0%)
Recurrent vaginitis	17 (85.0%)
Difficult defecation	15 (75.0%)
Urinary incontinence	13 (65.0%)
Urinary tract infections	10 (50.0%)
Dyspareunia	10 (50.0%)

Data are expressed as number (%).

About 20.0% of patients had diabetes mellitus, 15.0% had hypertension and 25.0% had chronic constipation. 90.0% of patients had previous episiotomy, number of episiotomies range from 1-5 times with mean 3.4. Physical examination of patients revealed that all 20 patients had rectocele and cystocele with variable grades. Rectocele grades were mostly grade 4 (50.0%) then grade 3 (35.0%) and grade 2 (15.0%). While, cystocele grades were mostly grade 3 (40.0%) then grade 2 (25.0%), grade 1 (20.0%) and lastly grade 4 (15.0%). Eight patients (40.0%) had urethrocele, all 20 patients had defective perineal body but 6 (30%) patients were having very deficient perineal body with close proximity of anal verge to genital vestibule. Two patients (10.0%) had atrophic vaginal mucosa and two patients (10.0%) had scarring and fibrotic bands of vaginal mucosa due to previous surgeries (Table 3).

Table 3 Medical and surgical histories.

Finding	Frequency (%)
Medical history	
Chronic constipation	5 (25.0%)
Diabetes mellitus	4 (20.0%)
Hypertensive	3 (15.0%)
Surgical history	
Previous episiotomy	18 (90.0%)
Number of episiotomy	3.40±1.31 (1.00-5.00)
Examination	
Rectocele with variable grades*	20 (100.0%)
Cystocele with variable grades**	20 (100.0%)
Perineal body defect***	20 (100.0%)
Urethrocele	8 (40.0%)
Vaginal mucosal status	
Normal	16 (80.0%)
Atrophic	2 (10.0%)
Scarred	2 (10.0%)

Data are expressed as number (%). *The grades of rectocele were 3 (15.0%) grade 2, 7 (35.0%) grade 3 and 10 (50.0%) grade 4. ** The grades of cystocele were 4 (20%) grade 1, 5 (25.0%) grade 2, 8 (40.0%) grade 3 and 3 (15.0%) grade 4. *** 6 (30%) patients were having very deficient perineal body with close proximity of the anal verge from the genital vestibule.

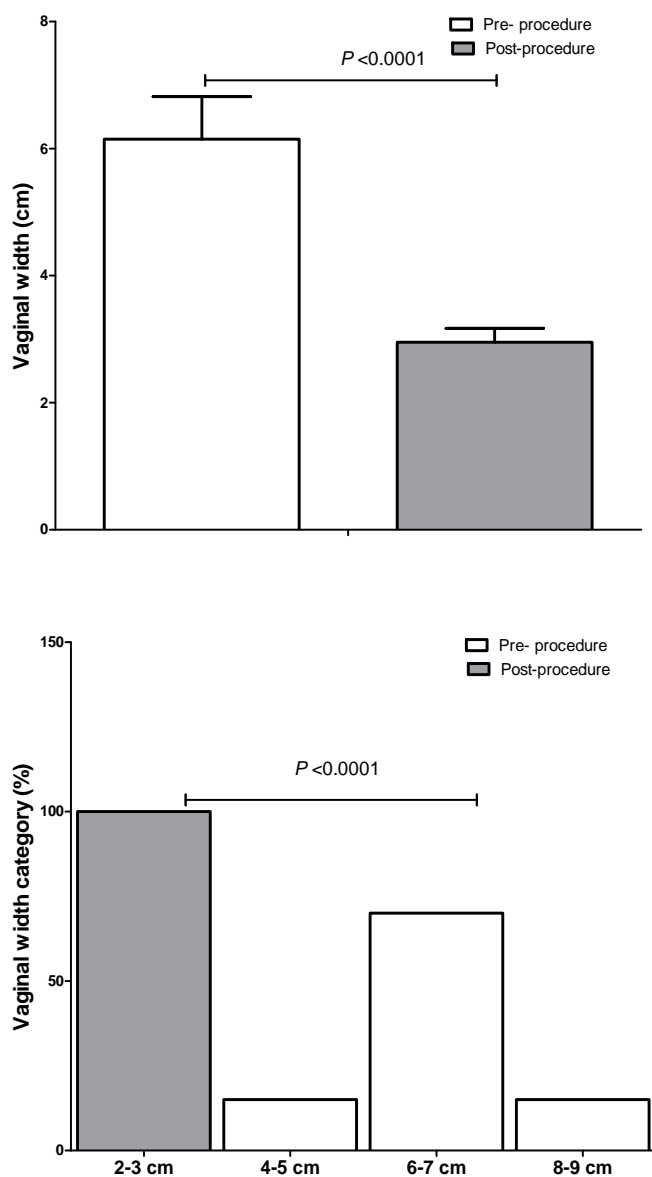
Table 4 showed the intraoperative vaginal width. The width were significantly decreased post-procedure compared to pre-procedure ($P < 0.0001$ for both). Pre-procedure vaginal width was 4-5 cm in 15% of cases, 6-7 cm in 70.0% and 8-9 cm in 15.0%. Post-procedure vaginal width was 2-3 cm in 100% of cases with significant difference between them ($P < 0.0001$).

Table 4 Intraoperative vaginal caliber

Vaginal	Pre- procedure	Post-procedure	Significance
Width (cm)	6.15±0.67 (5.00-8.00)	2.95±0.22 (2.00*-3.00)	$P<0.0001$
Width category			
2-3 cm	-	20 (100%)	$P<0.0001$
4-5 cm	3 (15.0%)	-	
6-7 cm	14 (70.0%)	-	
8-9 cm	3 (15.0%)	-	

Data are expressed as Number (%). Significance between Pre- and Post- Procedure was made usin Person Chi-Square test.

Figure 3 showed the intraoperative vaginal width. The width were significantly decreased post-procedure (2.95±0.22, range: 2.00-3.00) compared to pre- procedure (6.15±0.67, range: 5.00-8.00) ($P<0.0001$). Pre- procedure vaginal width was 4-5 cm in 15% (n=3) of cases, 6-7 cm in 70.0% (n=14) and 8-9 cm in 15.0% (n=3). Post-procedure vaginal width was 2-3 cm in 100% (n=20) of cases with significant difference between them ($P<0.0001$).

**Figure 3** Intraoperative vaginal caliber

Data are expressed as number (%). Significance between different weeks was made using Person Chi-Square test.

Pain scale at 1st week was 4-6 and 7-9 in 75.0% (n= 15) and 25.0% (n= 5) of cases respectively; at 3rd week, it was 1-3 and 4-6 in 95.0% (n=19) and 5.0% (n=1) of cases, respectively; at 6th week, it was 0 and 1-3 in 85.0% (n=17) and 15.0% (n=3) of cases, respectively, at 3rd months pain scale was 0 in 100% (n=20) of cases with significant difference between them ($P < 0.0001$). Vaginal width was 2-3 cm at 1st week, 3rd week, 6th week and 3rd month. The intercourse at 6th week was yes in 65.0% (n=13), no with reason in 25.0% (n=5) (were afraid of pain) and not active in 10.0% (n=2) (not married yet after divorce); mean while at 3rd month it became yes in 100.0% (n=20) of cases with significant difference between them ($P = 0.014$). Sexual satisfaction, at 6th week was yes in 60.0% (n=12), no with reason in 5.0% (n=1) (pain) and not active in 35.0% (n=7) (2 cases were not married yet, 5 cases did not yet started intercourse). Mean while at 3rd month it became yes in 100.0% (n=20) of cases with significant difference between them ($P = 0.007$) (Figure 4).

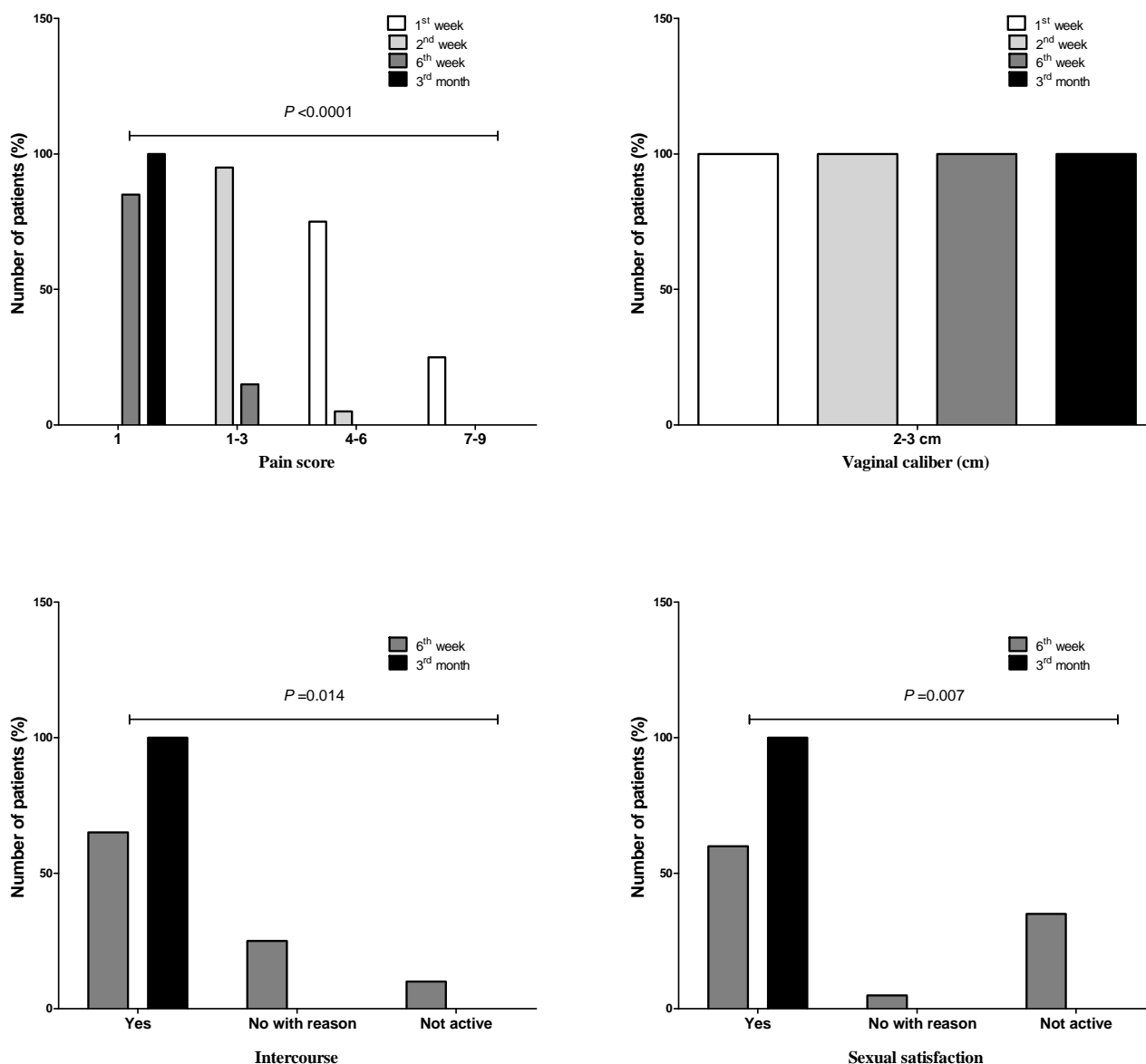


Figure 4 Postoperative pain score, vaginal caliberations, intercourse and sexual satisfaction.

Data are expressed as number (%). Significance between different weeks was made using Person Chi-Square test.

4. DISCUSSION

Female pelvic organ prolapse is widespread problem with estimated prevalence of 11%. It influences posterior, anterior, or both compartments. Patients number seeking care for POP is expected to raise to 45% in next few years (Obstetricians and Gynecologists, 2019). Rectocele is an outpouching of rectum anterior wall via a exhausted rectovaginal septum, forming a protrusion into posterior

vaginal wall. Rectocele is a only anatomical defect, its functional importance is hard to determine and seems to have little correlation with defect site and/ or size (Lefevre and Davila, 2008). Most of rectocele patients involved in this study were in age group 46-50 years (35.0%), married (90.0%), and delivery mode was spontaneous vaginal delivery (85.0%). About 25.0% had chronic constipation, 20.0% of patients had diabetes mellitus and 15.0% had hypertension. 90.0% of patients had previous episiotomy, number of episiotomies range from 1-5 times with most patients did it from 3 to 5 times. The exact rectocele causes are poorly understood and mostly multifactorial, but several risk factors had been postulated including age, multiparity, obesity, vaginal delivery, hypoestrogenism, menopause, genetic factors, connective tissue diseases, race, smoking, diseases that chronically raised intra-abdominal pressure and prior surgery (as episiotomy, hemorrhoidectomy, or hysterectomy) (Hendrix et al., 2002, Mustain, 2017). The labor forces can stress or destruct connective tissues, muscles, and nerves of rectovaginal septum and pelvic floor. The perineal body, levator ani complex and external anal sphincter can be destructed by traumatic obstetric tears or episiotomy (Allen et al., 1990). As muscular enforcement is debited, connective tissue of endopelvic fascia is liable to greater stretch and weaken under chronic stress and tension (DeLancey, 1993). Age-related destruction of connective tissue accompanied with chronic increased in intra-abdominal pressure from obesity or many straining destruction. Many of these risk factors can be interconnected and summated in their actions (De Lancey, 1993; Hendrix et al., 2002; Kluivers et al., 2020).

In this study, the presenting patients symptoms were mainly sexual dissatisfaction in 100.0% of patients, recurrent vaginitis (85.0%), difficult defecation (75.0%), urinary incontinence (65.0%), urinary tract infection (50.0%) and dyspareunia (50.0%). In this respect, it was reported that symptoms directly related to prolapse include pelvic pain or pressure, "bearing-down sensation" or "falling out sensation", prolapsing vaginal mucosa ulceration, low back pain, and problems with intravaginal intercourse (Mustain, 2017). Symptoms directly due to rectocele as defecatory dysfunction, inability to entirely distal rectum empty without straining, constipation, and dyspareunia (Committee on Practice Bulletins-Gynecology, 2007). However, constipation is considered a colonic motility defect not treated by posterior surgery (Bergman et al., 2020). Symptoms are often increased by lifting and standing and relieved by lying down.

Rectocele is a rectovaginal septum defect, not the rectum. As a gynecologist and pelvic surgeons an excellent understanding of normal pelvic anatomy and vertical and horizontal muscular, fascial, and ligamentous support of pelvic organs is very important in treating vaginal passage defects/laxity in rectocele and perineum sagging in weak end vertical pelvic support of perineal body (Hale and Fenner, 2016). Richardson described discrete defects in rectovaginal septum as reason of rectocele development (Richardson, 1995). The most common place is transverse break just above perineal body. Other defects were low vertical breaks in midline or lateral separations from iliococcygeus fascia. With exception of vertical midline, these "breaks" in septum happen essentially at fixation sites of posterior vaginal wall to bony pelvis, distally to perineum and lateral to levator complex. This fixation loss compromises posterior wall capability to withstand pressures from behind (Cundiff and Fenner, 2004). To attain a good perineal body reconstruction, perfect perineal muscle reconstruction (mainly bulbocavernosus and superficial transverse perineal muscles) to strengthen atrophic perineal body with lengthening of ano-genital distance that leads to improved genital hiatus and fulfill good distance to avoid contamination with vaginitis and urinary tract infections. Also, proper reconstruction of recto-vaginal septum that is made chiefly of denonvilliers fascia and pubo rectalis, pubo coccyges and pubo vaginalis taking in consideration to start repair from top of recto-vaginal septum at cervix to avoid vaginal shortening with good caliber. All of these considerations attained by using neuromuscular stimulator which has not been used before in vagino-perineorrhaphy reconstruction.

The occurrence of cysto-urethrocele and rectocele results in inconvenient urinary, rectal symptoms and vaginal laxity with negative impact on sexual satisfaction. This inconvenient symptom of cysto-urethrocele and rectocele forced the affected patients to seek treatment that differ according to defect from nonsurgical to surgical measures in the form of pelvic muscle reconstruction based on weakened part. In this prospective study, NMES was utilized intraoperatively in pre-repair evaluations in 20 patients with rectocele and cystocele with higher precision in identification of posterior vaginal wall and perineal muscles defects which in turn facilitate defects closure then reinforce the full vaginoperineal muscles and confirm completion of repair of whole posterior vaginal and perineum at post repair stimulation. The vaginal calibrations were evaluated preoperatively and immediate postoperatively that revealed the preprocedure vaginal width was 4-5 cm in 3 (15%) cases, 6-7 cm in 14 cases (70.0%) and 8-9 cm in 3 (15.0%) cases these changes immediately post-procedure to 2-3 cm in all 20 cases (100.0%).

Pain scale evaluation of our patients revealed improvement of pain during follow up period and all patients were free from pain by 3rd month follow up period. The intercourse and sexual satisfaction improved postoperatively, all 20 patients were satisfactory at 3rd month follow up period. Previous experiences of neuromuscular stimulation usage intraoperative were encountered by pediatric surgeons in anorectal malformations, mainly imperforate anus, where muscle stimulator usage revolutionized the repair of imperforate anus in posterior sagittal anorectoplasty in 1982 (deVries and Peña, 1982). A crucial procedure part was precise sphincter muscles localization prior to performing pull-through operation. In order to do that, the surgeon used neuromuscular

stimulator connected to sterile cable and set to 50 pulses per second during operation. The stimulator showed the muscle sphincter complex inaccuracy. After that, Kapuller *et al.* used neuromuscular stimulator entirely intraoperative. It was effective in babies and in older population (up to 20 years) (Kapuller *et al.*, 2014). Sacral nerve stimulation is well-established in fecal incontinence therapy in adult in whom conservative treatments not effective (Govaert *et al.*, 2009; Matzel, 2010; Mowatt *et al.*, 2007). Kumar *et al.* (2006) used sacral nerve stimulation for intraoperative mapping of sacral plexus nerve roots in neurosurgery. NMES used for treatment of urinary incontinence and strengthening of PFMs (Correia *et al.*, 2014; Fürst *et al.*, 2014; Heidland *et al.*, 2013).

This is the first study to report electric stimulation of PFMs for rectocele management. We demonstrated the feasibility of PFMs electrical stimulation for intraoperative defective muscle mapping in rectocele repair. PFMs stimulation can help the surgeon to operate closer to individual anatomy. Although this study suggests that transvaginal neuromuscular excitation detect defects in perineo-vaginal muscles in patients with rectocele preoperatively facilitate proper defects repair and confirming completion of repair of perineum and rectovaginal septum at procedure end with improved symptoms and surgical reconstructive outcome over follow up period of 3 months, the limitation is that it should be considered an initial study; its results should be considered preliminary and in need of replication with larger number of cases and longer follow up periods for further evaluation and confirmation.

5. CONCLUSION

The results of this study revealed the advantages of use of neuromuscular stimulator in rectocele repair evaluation. In pre repair, it is important in identifying defective part of the perineal muscles and rectovaginal septum, particularly feeling of defects at contraction phase. While, during repair, it is important for proper placement of stitches starting by defective part as it clarify defect situation preoperatively and then reinforcing whole posterior vaginal wall and perineum. In post repair, it is important to ensure repair completion without any residual defects or resulting spot or segmental stenosis or vaginal passage angulation that might happen by cross-suturing of lateral part of PFMs which can be clearly identified during contraction phase of neuromuscular stimulations. The satisfactory structural and functional results of surgical repair in 20 patients led to highly recommend neuromuscular stimulator usage during operations in vaginal perineal repair.

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Author Contributions

Ettedal Al Jahdali designed, conceived the study, acquisition, analysis, interpretation of data for the work, wrote the manuscript, and approved the final version for publication.

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Conflict of Interest

The authors declare that there are no conflicts of interests.

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

Ethical approval for human

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards (study was approved by the Medical Ethics Committee of King Abdulaziz University (ethical approval number 410-20).

Data and materials availability

All data associated with this study are present in the paper.

Peer-review

External peer-review was done through double-blind method.

REFERENCES AND NOTES

1. Allen R, Hosker G, Smith A, Warrell D. Pelvic floor damage and childbirth: a neurophysiological study. *BJOG: An International Journal of Obstetrics & Gynaecology* 1990; 97:770-779.
2. Bergman I, Söderberg MW, Ek M. Perineorrhaphy Compared With Pelvic Floor Muscle Therapy in Women With Late Consequences of a Poorly Healed Second-Degree Perineal Tear: A Randomized Controlled Trial. *Obstetrics & Gynecology* 2020; 135:341-351.
3. Breivik H, Borchgrevink P, Allen S, Rosseland L, Romundstad L, Breivik Hals E, Kvarstein G, Stubhaug A. Assessment of pain. *BJA: British Journal of Anaesthesia* 2008; 101:17-24.
4. Committee on Practice Bulletins-Gynecology A. ACOG Practice Bulletin No. 79: Pelvic organ prolapse. *Obstetrics and gynecology* 2007; 109:461.
5. Correia GN, Pereira VS, Hirakawa HS, Driusso P. Effects of surface and intravaginal electrical stimulation in the treatment of women with stress urinary incontinence: randomized controlled trial. *European Journal of Obstetrics & Gynecology and Reproductive Biology* 2014; 173:113-118.
6. Cundiff GW, Fenner D. Evaluation and treatment of women with rectocele: focus on associated defecatory and sexual dysfunction. *Obstetrics & Gynecology* 2004; 104:1403-1421.
7. DeLancey JO. Anatomy and biomechanics of genital prolapse. *Clinical obstetrics and gynecology* 1993; 36:897-909.
8. deVries PA, Peña A. Posterior sagittal anorectoplasty. *Journal of pediatric surgery* 1982; 17:638-643.
9. Fürst MCB, Mendonça RRd, Rodrigues AO, Matos LLd, Pompeo ACL, Bezerra CA. Long-term results of a clinical trial comparing isolated vaginal stimulation with combined treatment for women with stress incontinence. *Einstein (Sao Paulo)* 2014; 12:168-174.
10. Govaert B, Melenhorst J, Nieman FH, Bols EM, van Gemert WG, Baeten CG. Factors associated with percutaneous nerve evaluation and permanent sacral nerve modulation outcome in patients with fecal incontinence. *Diseases of the colon & rectum* 2009; 52:1688-1694.
11. Guntinas-Lichius O, Eisele DW. Facial nerve monitoring. *Salivary Gland Neoplasms*, 2016. vol. 78, Pages 46-52. Karger Publishers.
12. Gyhagen M, Bullarbo M, Nielsen T, Milsom I. Prevalence and risk factors for pelvic organ prolapse 20 years after childbirth: a national cohort study in singleton primiparae after vaginal or caesarean delivery. *BJOG: An International Journal of Obstetrics & Gynaecology* 2013; 120:152-160.
13. Hale DS, Fenner D. Consistently inconsistent, the posterior vaginal wall. *Am J Obstet Gynecol* 2016; 214:314-320.
14. Hasselbeck C, Reingruber B. Sacral nerve stimulation is a valuable diagnostic tool in the management of anorectal and pelvic malformations. *Journal of pediatric surgery* 2012; 47:1466-1471.
15. Heidland A, Fazeli G, Klassen A, Sebekova K, Hennemann H, Bahner U, Di Iorio B. Neuromuscular electrostimulation techniques: historical aspects and current possibilities in treatment of pain and muscle wasting. *Clin Nephrol* 2013; 79:S12-S23.
16. Hendrix SL, Clark A, Nygaard I, Aragaki A, Barnabei V, McTiernan A. Pelvic organ prolapse in the Women's Health Initiative: gravity and gravidity. *Am J Obstet Gynecol* 2002; 186:1160-1166.
17. Kapuller V, Arbell D, Udassin R, Armon Y. A new job for an old device: A novel use for nerve stimulators in anorectal malformations. *Journal of pediatric surgery* 2014; 49:495-496.
18. Kershaw V, Khunda A, McCormick C, Ballard P. The effect of percutaneous tibial nerve stimulation (PTNS) on sexual function: a systematic review and meta-analysis. *International urogynecology journal* 2019; 30:1619-1627.
19. Kluivers KB, Lince SL, Ruiz-Zapata AM, Cartwright R, Kerkhof MH, Widomska J, De Witte W, Post WM, Pecanka J, Kiemeny LA. Molecular landscape of pelvic organ prolapse provides insights into disease etiology and clues towards putative novel treatments. *Med Rxiv* 2020;
20. Lefevre R, Davila GW. Functional disorders: rectocele. *Clinics in colon and rectal surgery* 2008; 21:129-137.
21. Matzel K. Sacral nerve stimulation for fecal incontinence: What has been achieved: Current status. *Acta chirurgica iugoslavica* 2010; 57:67-72.
22. Milsom I, Altman D, Cartwright R, Lapitan M, Nelson R, Sillén U, Tikkinen K. Epidemiology of urinary incontinence (UI) and other lower urinary tract symptoms (LUTS), pelvic organ prolapse (POP) and anal incontinence (AI). 2013. Pages 15-107. *Incontinence: 5th International Consultation on Incontinence*, Paris, February 2012, ICUD-EAU.
23. Mowatt G, Glazener CM, Jarrett M. Sacral nerve stimulation for faecal incontinence and constipation in adults. *Cochrane Database of Systematic Reviews* 2007:CD004464.
24. Mustain WC. Functional disorders: rectocele. *Clinics in colon and rectal surgery* 2017; 30:063-075.
25. Obstetricians A Co, Gynecologists. Pelvic organ prolapse. *Female Pelvic Medicine & Reconstructive Surgery* 2019; 25:397-408.
26. Richardson A. The anatomic defects in rectocele and enterocele. (1995). *J Pelvic Surg* 1 (4): 214 1995; 221
27. Richardson AC. The rectovaginal septum revisited: its relationship to rectocele and its importance in rectocele repair. *Clinical obstetrics and gynecology* 1993; 1:214-221.

28. Rodrigues MP, Barbosa LJ, Paiva LL, Mallmann S, Sanches PR, Ferreira CF, Ramos JG. Effect of intravaginal vibratory versus electric stimulation on the pelvic floor muscles: A randomized clinical trial. *European journal of obstetrics & gynecology and reproductive biology*: X 2019; 3:100022.
29. Sujit Kumar GS, Rajshekhar V, Babu KS. Intraoperative mapping of sacral nervous system (S2–4). *British journal of neurosurgery* 2006; 20:396-402.