Evaluation of Pelvic Floor Muscle Function(PFMF) In Cervical Cancer Patients With Querleu-Morrow Type C Hysterectomy: A Multicenter Study

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Research Article

Keywords: Pelvic floor muscle strength(PFMS), Pelvic floor muscle function(PFMF),Cervical cancer, Querleu-Morrow type C hysterectomy (QM-C hysterectomy), Follow-up time

Posted Date: September 16th, 2021

DOI: https://doi.org/10.21203/rs.3.rs-501041/v1

Version of Record: A version of this preprint was published at Archives of Gynecology and Obstetrics on October 28th, 2021. See the published version at https://doi.org/10.1007/s00404-021-06290-6.

Abstract

Introduction To evaluate the pelvic floor muscle function (PFMF) of cervical cancer patients after type QM-C hysterectomy and to explore the relationship between decreased PFMF and related factors..

Methods This was a multi-centered retrospective cohort study. 181 cervical cancer patients who underwent type QM-C hysterectomy were enrolled from 9 tertiary hospitals. Strength of PFMF were measured by using neuromuscular apparatus (Phenix U8, French). Risk factors contributing to decreased PFMF were analyzed by univariate and multivariate ordinal ploytomous logistic regression.

Results Totally 181 patients were investigated in this study. 0-3 level of type I muscle fibre strength(MFSI) was 52.6% (95/181), 0-3 level of type A muscle fibre strength(MFSA) was 50% (91/181). Subjective stress urinary incontinence was 46%(84/181), urinary retention was 27.3% (50/181), dyschezia was 41.5% (75/181), fecal incontinence was 9%(18/181). MFSIMultivariate ordinal ploytomous logistic regression shows that the follow-up time(*p*<0.05), chemotherapy and radiotherapy (*p*=0.038) are independent risk factors of MFSI's reduction after type QM-C hysterectomy. MFSAMultivariate ordinal ploytomous logistic regression shows that the follow-up time (*p*<0.05) are independent risk factors of MFSA's reduction after type QM-C hysterectomy. The pelvic floor muscle strength (PFMS) increased after 9 months than in 9 months after operation, which showed that the PFMS could be recovered after operation.

Conclusions We advocate for more attention and emphasis on the PFMF of Chinese female patients with cervical cancer postoperation.

Contribution of the Paper PFMF after QM-C hysterectomy has not been analyzed by current study. The contribution is that patients with radical hysterectomy should do pelvic floor rehabilitation exercises in 3 months after operation.

Brief Summary

The evaluation and analysis of PFMS were conducted after QM-C hysterectomy to find that the influencing factors were radiotherapy, chemotherapy and the follow-up.

Introduction

The morbidity of cervical cancer is high. However, advanced technology enables more cervical cancer patients to be diagnosed at early stage nowadays. With QM-C hysterectomy plus pelvic lymphadenectomy, the rate of 5-year survival of cervical cancer patients could reach 95%[1] .However, evidences showed that type QM-C hysterectomy may greatly influence the pelvic floor function of the patients, mainly leading to lower urinary tract symptoms(LUTS),[2, 3] defecation disorders[4, 5] and sexual dysfunction.[6] All of those problems would negatively affect the life quality of the patients for a long time. Dysfunction of the pelvic floor muscles(PFM)might result in urinary and faecal incontinence, pelvic organ prolapse (POP), sexual problems, and chronic pain.[7] As PFM provides support and sphincteric functions to the pelvic organs, investigation into PFM function is crucial to helping patients with pelvic floor disorders (PFD). [8, 9]

The PFM are mainly consisted of type I and type II muscle fibers.[10] PFM play an important role in maintaining vaginal constriction and the normal position of the organs in pelvis and, thus, further in keeping the normal function of urethral sphincter and rectal sphincter.[11] Overactive bladder (OAB) and urinary incontinence (UI) are the two common courses that could have negative impacts on women's quality of life. PFM training is the most preferred treatment to increase PFM strength (PFMS) in women with stress urinary incontinence (SUI).[12–16] The life quality of the patient is expected to be improved if the elements affecting post QM-C hysterectomy PFMS were analyzed and treated after type QM-C hysterectomy. However, there were only few studies focusing on the post QM-C hysterectomy PFMF. Our aim is to identify the elements resulting in PFM weakness in patients who underwent QM-C hysterectomy for cervical cancer and to provide a solution to the problems.

The PFM plays an important role in supporting the pelvic and abdominal organs and controlling urinary and fecal continence in addition to their role in the sexual function[17]. The types of PFMF included: MFSI belonged to the pelvic and abdominal cavity support system, accounting for 70% of the pubic vaginal and puborectalis muscles, 90% of the pubis caudal muscles, and 68% of the sacral and posterior tibial muscles. The function was characterized by tonic contraction, long contraction time and long-lasting, and it was not easy to fatigue. MFS□A belong to the pelvic and abdominal cavity movement system, and their staged, rapid and short-lived contraction easily lead to fatigue.[18] PFMS is very important to female patients because decreased PFMS could cause LUTS, defecation disorders, and sexual dysfunction.[19] It would greatly affect the quality of patients' life.

The above mentioned three PFD diseases are closely related to the reduction of PFMS. According to reports, for women who demonstrated SUI during pregnancy and delivery, postpartum SUI was mostly linked to weakening of PFM [20]. After being comprehensively and accurately assessed, PFM rehabilitation was able to enhance PFM strength[21–22] and muscle tone, which gave rise to improvement of SUI[23–24]. The most popular assessment methods in China for assessing the condition of PFM in postpartum female patients were the digital palpation and electromyography(EMG) evaluation because of easy access to relevant equipment and low cost[25]. EMG was mostly utilized to meassure muscle activity, analyze intramuscular force ratio and record PFM dysfunction [26]. As a result, we chose EMG as the evaluation method to record the pelvic muscle strength. Pelvic floor exercise and biofeedback from patients with cervical cancer surgery, and pelvic floor rehabilitation for patients with PFD could improve the life quality of patients. However, there was no retrospective study for systematic examination and analysis, and PFMS was not being measured in patients with cervical cancer.

The morbidity of cervical cancer was high, and cervical cancer was one of the common malignant tumors in gynecology. The annual new cases in China accounted for about 1/3 of the total new cases worldwide[27]. The standard treatments for invasive cervical cancer were surgical treatment and radiotherapy supplemented by chemotherapy. Annually, about 83.9% of cervical cancer patients in China undergo surgical treatment with the main procedure being QM-C hysterectomy and pelvic lymphadenectomy[28]. With the improvement of cervical cancer screening in recent years, the trend of rejuvenation was obvious and the 5-year survival rate of patients with early stage of cervical cancer has been improved [29]. Patients with early stage of cervical cancer could survive or even lead a high-quality life after treatment. However, due to the large scope of surgery, the preoperative removal of para-uterine tissue in QM-C hysterectomy procedures could also damage the pelvic floor nerves, muscles and fascia. As a result, radiotherapy and chemotherapy would lead to pelvic tissue fibrosis, low ovarian function and even failure, resulting in postoperative PFD, which greatly affects the life quality of patients. At present, there was still a lack of large-scale study on the incidence of pelvic floor dysfunction and related factors in cervical cancer patients who are mainly treated with surgery. This study performed retrospective analyses PFMS measurement and other methods to assess the PFMS of 181 patients with cervical cancer after QM-C hysterectomy.

Materials And Methods

1. Patient recruitment:

The patients were recruited from the cervical cancer patients who underwent QM-C hysterectomy participating hospitals during January 2012 to March 2015. Patients were included if they were 1) ≥18 years of age, 2) underwent QM-C hysterectomy for cervical cancer for 3-24 months, and 3) consent to participation by signing the informed consent form. Patients were excluded if they 1) experienced preoperative adjuvant radiotherapy, 2) had received pelvic floor rehabilitation after surgery, 3) had less than 3cm of main secral ligament resection and /or less than 3cm of vaginal resection, and 4) could not complete questionnaires or PFMS evaluation. For the first step of patient enrolment, eligible patients were examined by two experienced gynecologic oncologists at the participating hospitals for pelvic floor function, and were staged according to the patient's medical history and clinical manifestations following the clinical staging criteria of cervical cancer revised by FIGO in 2009.

Patients who met the inclusive criteria were contacted and invited by the investigators to participate the study. By explaining the study in detail, informed consent forms approved by the Institutional Review Board (IRB) of Peking University People’s Hospital were signed by the patients and the doctor when relevant confusion and worries fairly sloved. Patients who had denied were excluded fromthe analysis.

2. Methods

The PFMS and the life quality of the patients were evaluated and the relevant factors were investigated in a stratification of deferent post-surgery periods as 3-6 months, 7-9 months, 10-12 months, 13-18months, 19-24 months. Eligible patients went through the procedures as shown in Figure 1 and described as the follows:

1) Demographic data collection: Demographic data was collected through interviewing the eligible patients in a private room by an investigator who did not perform treatment on the patient and was blind of the patient's history. Data that was collected includes the age, body mass index (BMI), preoperative comorbidities, number and mode of deliveries, clinical staging, and type of hysterectomy, etc..

2) Clinical Record Review: Clinical record on the QM-C hysterectomy was checked to confirm the resected part of the Main sacral ligament was ≥3cm and that of the vagina was ≥ 3 cm. Treatment information would be also collected for analysis.

3) Clinic Examination: Detailed physical examination would be conducted by trained investigators, followed by laboratory examination and test as described below.

3. PFMS Examination

PFMS examination was conducted under relevant guidelines and regulations from a book which was written by academician Jinghe Lang[21].

Instruments

Phenix USB8 biofeedback system (Electron-IC Concept Lignon Innovation Co., France), the same equipment as used in Navarro Brazález B's study [16], was used to test the PFMS of the patients. The manometer was interfaced with the biofeedback system that was installed in an IBM compatible personal computer. A vaginal pressure probe (see Figure 1A) of 115 mm in length (Foshan Shanshan Datang Medical Technology Co., Ltd. China) inside of an airbag was linked with the manometer. The 41mm-long airbag was used for enlarging the vagina by inflating it to be over-sized with air. Manometry and dynamometry were more reliable than vaginal palpation for the assessment of PFM strength in women with PFD, especially when different raters were involved[16].

PFM Fibers categorization

The PFM fibers were categorized into two types: type I and type II fibers. Type I fibers, also called sustained contraction muscles or slow muscle fibres, is featured to have long lasting contraction and is not easy to fatigue. They support the pelvic organs.Most type II fibers are commonly distributed in the levator ani muscle. Type II fibers, also called as rapid contraction muscles or fast muscle fibres, provide quick and short contraction, and are easy to fatigue. If the PFM can not contract quickly enough to control the urination and defecation function,the type II fibers need to be exercised.[30]They are mostly distributed in the superficial layer of the pelvic floor. PFMS measurement tested the strength of the muscle contraction, the ability of the muscle to resist resistance, the duration, symmetry and fatigue of the muscle contraction, the ability of the muscle in repeat contractions, and the rapid contraction times. Research evidence showed that changes of these basic electro-physiological indicators were usually detectable earlier than pelvic floor dysfunction appeared and could be used as an evaluative index for early detection of pelvic floor dysfunction and the treatment outcomes. By comparing the postoperative

PFMS of the two groups of patients we could objectively evaluate the functional status of the pelvic floor.

Measurement of PFMS

The baseline pressure was set to 0cm H_2O. Patients were asked to contract their PFM for measurement of type I muscle fibers strength (MFS-I) by squeezing for 5 times in maximum.The total width of Figure 1 represents 10 seconds and the width of the yellow module represents 6 seconds. When the patient's MFS-I contraction called the sustained contraction made the red curve reach 40% of the yellow module height, the patient would be instructed to contract her vagina with maximum power for three times to obtain the maximum and minimum vaginal manometry values. The peaks of the yellow module in Figure 1B represents the maximum value of the vaginal manometry, while level 0 to level 5 represent the duration of the muscle strength (MSD) from 0s to 5s, respectively. Figure 1C shows the muscle strength rapid contraction levels when the type IIA PFM contraction made the red curve reach to 60% - 70% of the yellow module height (referring to Figure 1C). Figure 1D shows the muscle strength rapid contraction levels when the type IIB PFM contraction made the red curve reach to 90%-100% of the yellow module height (referring to Figure 1D).

Comparing of the MFS

To identify the factors that impact the MFS of the enrolled patients, they were categorized into 3 groups according to the therapies they underwent. Patients who underwent surgery only were referred as Group-S; patients who underwent surgery plus radiotherapy were referred as Group-SR; patients who underwent surgery and chemotherapy were referred as Group-SC; and those who were treated with surgery followed by radiotherapy and chemotherapy were referred as Group-SRC. MFS-I and IIA were compared among those groups.

Statistical Analysis

Statistical analysis was performed using R software programming. Ordinal ploytomous logistic regression was used to analyze the influencing factors of MFS of type I and IIA after QM-C hysterectomy. The PFMS was categorized into three groups according to the measured duration levels, with which group A referred to patients with 0 level MSD, group B referred to those with 1-3 level MSD, while group C referred to those with 4-5 level of MSD. A p values of < 0.05 was considered statistically significant in comparison of the PFMS in different periods after QM-C hysterectomy, excluding the confounding factors, in order to analyze the influencing factors of the postoperative PFMS in patients with cervical cancer..

Results

A total of 689 patients who underwent QM-C hysterectomy for cervical cancer at the referral center between January 2012 and March 2015 and met the enrollment criteria were approached for the study, among which 181 patients consented for participation by signing the Informed Consent Form and being enrolled for pelvic floor function screening. Of the 181 patients, 170 completed data of pelvic floor function examinations for both type I and type ⅡA MFS (see Fig. 2) .

Table 1 describes the age, body mass index, parity, mode of baby production, FIGO staging, treatment type, and the postoperative follow-up time of the enrolled patients (see Table 1). Of the 181 enrolled patients, 22.1% (40) were detected as level 0, 30.5% (55) as level 1–3, and 47.4% (86) as level 4–5 of type I MFS, while 15.3% (28) of them were detected as level 0, 34.7% (63) as level 1–3, and 50% (90) as level 4–5 of type IIA MFS. The interviewing to those patients shows that 46% (83) of them had SUI, 27.3% (49) had UR, 41.5% (75) had dyschezia, and 9% (16) suffered fecal incontinence; 77.5% of the patients were not satisfied with their sexual life. All these data suggests that the therapy of cervical cancer they underwent have significant negative influences on patients' pelvic function, and PFMS is an important pelvic floor function indicator to assess that influences (See Table 2).

Univariate analyses to the risk factors of the 181 enrolled patients showed that the type I muscle fiber strength (MFS-I) of Group SR was significantly worse than Group-S (Group-SR vs Group-S, est 0.203, 95% CI 0.071–0.577, p = 0.003), and that MFS-I of the patients who were 18–24 months after operations was significantly better than that of the patients who were 3–6 months after surgery (18-24months vs 3-6months, est 2.539, 95% CI 1.077–5.987, p = 0.033); the type IIA muscle fiber strength (MFS-IIA) of the patients in Group-SR was significantly worse than those in Group-S (Group-SR vs Group-S, est 0.333, 95% CI 0.119–0.931, p = 0.036) (Table 3). Results from univariate analyses suggest that multiple therapies have negative impact on MFS-I and MFS-IIA and recovery time helps MFS recovery.

We also performed multivariate regression analysis on each of the factors as: postoperative period and treatment methods. After excluding confounding factors, we found that MFS-I of Group-SR were significantly worse than that of Group-S (Group-SR vs Group-S, est 0.230, 95% CI 0.072–0.738, p = 0.013); and the muscle strength of patients in Group-SRC was significantly worse than that of the patients in Group-S (Group-SRC vs Group-S, est 0.428, 95% CI 0.192–0.954, p = 0.038). Muscle strength in Group SC was different with that of Group-S but not statistically significant (Group SC vs Group-S, est 0.602, 95% CI 0.388–1.731, P = 0.602). Results from multivariate regressive analyses also suggest the negative impacts of multiple therapies on MFS-I and MFS-IIA recovery.

In comparing the MFS of the patients with different post-treatment periods (PTP), patients with PTP of 18–24 months, 12-18months and 9–12 months are all significantly worse than patients with a PTP of 3–6 months (18–24 mths vs 3-6m, est 3.126, 95% CI 1.278–7.647, p = 0.013; 12-18mths vs 3-6m, est 3.194, 95% CI 1.339–7.617, p = 0.009; and 9–12 mths vs 3–6 mths, est 3.816, 95% CI 1.095–13.302, p = 0.036, respectively). However, patients with a PTP of 6–9 months is not significantly worse and those with a PTP of 3–6 (6-9m vs 3-6m, est 1.592, 95% CI 0.641–3.954, p = 0.316). This result suggests a time-base trends of MFS which is the longer the PTP is, the worse the MSF is.

The results also show that MFS-ⅡA of the patients in Group-SR was better than that of patients in Group-S with no statistical significance (Group-SR vs Group-S, est 0.318, 95% CI 0.100-1.009, p = 0.052), although the P value is close to 0.05. It was suggested that radiotherapy might be a risk factor for type II pelvic floor muscle fibers .

When comparing MFS-IIA of the patients with different PTPs, patients with a PTP of 18-24mths, 12-18mths, 9-12mths, and 6-9mths are all better than patients with PTP of 6-9mths, but significant differences only exist in the comparisons between patients with PTP of 12-18mths and those with PTP of 3-6mths (12-18m vs 3-6m, est 2.385, 95% CI 1.007–5.649, p = 0.048) and that between patients with a PTP of 9-12mths and those with PTP of 3-6mths (9-12m vs 3-6m, est 5.178, 95% CI 1.454–18.445, p = 0.011), with no difference shows in comparisons between patients with PTP of 18–24 and those with PTP of 3–6 (18-24m vs 3-6m, est 1.981, 95% CI 0.815–4.815, p = 0.131) and that between patients with PTP of 6–9 and those with PTP of 3–6 (6-9m vs 3-6m, est 1.257, 95% CI 0.505–3.126, p = 0.623) (See Table 4). Those results suggest that most of the MFS-IIA recovery may took place in 9–12 months of PTP.

Discussion

Our study conducted a postoperative questionnaire survey of 689 patients and performed PFMS examination in 181 patients. From our analyses, PFMS is likely at a low level within 9 months after treatments and can recover after 9 months since surgery. Therefore, pelvic-floor-function rehabilitative treatment might have a certain protective effect on the pelvic floor function of patients with cervical cancer if it can be started in 3 month post the treatments. Currently there is no literature that examined and analyzed the muscle strength of patients with cervical cancer. As a clinical registered study, this study not only investigated the MFSI and MFSIIA of patients with cervical cancer surgery, but also evaluated the risk factors for the reduction of PFMS.

The results of this study showed that significant attenuation of MFS-I is directly related with radiotherapy as a single factor and multivariate analysis showed radiotherapy to be an independent risk factor on attenuation of MFS-I ($P < 0.05$). The fact that MFSI radiotherapy led to the formation of tissue scars in muscles and ligaments might be a fair explanation for the weakness of Type I fibers after radiotherapy. Our results also showed that MFS-I remained at a poor level within 9 months after treatment and MFS-I recovered and maintained at a certain level that was lower than the normality in 9–24 months after treatments, demonstrating that the muscle strength recovered gradually long with the prolonging of PTP, which could support recommendation for muscle fibers exercise within 3 months after surgery.

Multivariate regression analysis showed that radiotherapy was also an independent risk factor for MFS-IIA ($P < 0.05$), which could result in significant weakness of type IIA muscle fibers. However, multivariate analysis showed that MFS-IIA of the patients with PTP of 9–18 months had been significantly improved in comparing with patients with a PTP of six months, but that of the patients with a PTP of 6–9 months and 18–24 months had not been significantly bettered, although they were getting little better. This indicates that the improvement of MSF-IIA can be improved along with the PTP prolonging but the obvious improvement happens during 9–18 month after the treatments (See Fig. 4). Our long-term follow-up on some of the patients showed that, MFS-IIA could be significantly improved after one and a half years of PTP.

As a retrospective analysis study, this paper has limitation regarding the enrollment of patients, who are with different periods of PTPs. Perspective study should focus on data collection of patients with PTP of same period to demonstrate the exact impacts of the risk factors on the MFS. In our study, it was very difficult to get the specific and objective parameters of PFMS of 181 cervical cancer patients. However, the results indicate how and when the doctors should have such patients to exercise pelvic floor muscle after operation, which is valuable for recovery.

In conclusion, radiotherapy was an independent factor which negatively impacted the recovery of both type I and IIA pelvic floor muscle fibers; Weakness of PFMF could develop along with the time after treatment, and most of the recovery took place during 9-12months of PTP. Pelvic floor muscle exercise should be prescribed to the patients with 3 months after the treatments.

Declarations

Ethical Approval

This was a multi-center and retrospective cohort study, and the research protocol was approved by the Institutional Review Board(IRB) .(IRB number 2015PHB021-04).

Funding sources

This work is funded by the National Key Technology R&D Program of China (nos. 2019YFC1005200 and 2019YFC1005203), Major scientific and technological project of the Beijing Science and Technology Committee (D151100001915003) and The National Key Technology R&D Program(No.2015BAI13B06).

Conflict of interest

None.

Acknowledgements

The authors would like to thank Xiaojie Yu and Xiaodan Li for their contribution to the data collection and Huixin Liu for her contribution in the data analysis.

Author Contributions

Jianliu Wang, Zhiqi Wang, Hongwu Wen,Yunong Gao,Qiubo Lv,Hongyu Li,Sumei Wang,Yanlong Wang,Qing Liu,Jinsong Hanand Haibo Wang: Project development.

Sha Wang, Shiyan Wang,Qing Wang,Tingting Cao and Huaxin Sun: Data collection.

Na Yu and Yi Li :Data analysis.

Shiyan Wang,Jianliu Wang and Xiuli Sun wrote the main manuscript.

All authors reviewed the manuscript.

Clinical Trails NCT number of this study is 02492542.

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Tables

Table 1. Demographic and Clinical Characteristics of 181 CC Patients

Characteristic	Number(%) Total = 181
Age(year)	
< 47	92(50.8)
>= 47	89(49.2)
Body mass index (kg/m2)	
< 28	160(88.4)
>= 28	21(11.6)
Parity	
< 2	102(56.4)
>= 2	79(43.6)
Mode of delivery	
caesarean	21(11.6)
Naturallabor	153(84.5)
No Labor	7(3.9)
FIGO clinical stage	
IB1+IIA1	128(70.7)
IB2+IIA2	33(18.2)
1A	11(6.1)
IIB	9(5)
Grading	
1	43(23.8)
2	138(76.2)
Treament type	
Surgery	68(37.6)
SurgeryChemoRadio	45(24.9)
SurgeryChemo	54(29.8)
SurgeryRadio	14(7.7)
The follow-up time	
3 - 6m	38(21)
6 - 9m	35(19.3)
9 - 12m	17(9.4)
12 - 18m	50(27.6)
18 - 24m	41(22.7)

Table 2. Proportion of pelvic floor muscle strength and pelvic floor dysfunction symptoms after treatment of cervical cancer

Muscle strength and symptoms	Number(%) Total = 181
Type I muscle fiber strength	
0	40(22.1)
1-3	55(30.5)
4-5	86(47.4)
Type II muscle fiber strength	
0	28(15.3)
1-3	63(34.7)
4-5	90(50)
Stress urinary incontinence	
NO	97(54)
YES	84(46)
Urinary retention	
NO	131(72.7)
YES	50(27.3)
Dyschezia	
NO	106(58.5)
YES	75(41.5)
Fecal incontinence	
NO	163(91)
YES	18(9)
Sexual life satisfaction	
YES	41(22.5)
NO	141(77.5)

Table 3. Univariate analysis for muscle strength（muscle fiber I and muscle fiber II）ordinal ploytomous logistic regression，CI confidence interval，est

Characteristic	Muscle.fiber.I				Muscle.fiber.II			
	est	lower.ci	upper.ci	P.value	est	lower.ci	upper.ci	P.value
Age(year)								
< 47								
>= 47	0.978	0.567	1.687	0.936	0.655	0.376	1.143	0.136
Body mass index (kg/m2)								
< 28								
>= 28	0.897	0.376	2.137	0.806	1.136	0.476	2.710	0.774
Parity								
< 2								
>= 2	0.709	0.408	1.232	0.222	0.758	0.434	1.323	0.330
Mode of delivery								
caesarean								
Naturallabor	1.294	0.565	2.960	0.542	1.099	0.480	2.518	0.823
No Labor	2.678	0.419	17.115	0.298	1.082	0.196	5.971	0.928
FIGO clinical stage								
IB1+IIA1								
IB2+IIA2	0.746	0.374	1.486	0.405	1.041	0.509	2.129	0.913
1A	1.081	0.321	3.637	0.900	0.944	0.274	3.252	0.927
IIB	0.986	0.251	3.865	0.984	1.082	0.282	4.147	0.909
Treament type								
Surgery								
SurgeryChemoRadio	0.599	0.293	1.222	0.159	0.721	0.350	1.486	0.375
SurgeryChemo	0.882	0.444	1.752	0.721	0.735	0.369	1.466	0.383
SurgeryRadio	0.203	0.071	0.577	*0.003*	0.333	0.119	0.931	*0.036*
The follow-up time								
3 - 6m								
6 - 9m	1.284	0.539	3.063	0.572	1.239	0.518	2.963	0.629
9 - 12m	2.046	0.669	6.260	0.209	3.206	1.013	10.149	0.048
12 - 18m	2.218	0.981	5.014	0.056	2.078	0.928	4.653	0.075
18 - 24m	2.539	1.077	5.987	*0.033*	1.817	0.771	4.281	0.172

Table 4. Multivariate analysis for muscle strength, muscle fiber I and muscle fiber II, ordinal ploytomous logistic regression, CI confidence interval, est

	Adjusted Muscle.fiber.I							Adjusted Muscle.fiber.II				
Variables	Value	Std. Error	t value	p value	est	lower ci	upper ci	Value	Std. Error	t value	p value	est
Treament type												
Surgery												
SurgeryChemoRadio	-0.850	0.410	-2.075	*0.038*	0.428	0.192	0.954	-0.200	0.413	-0.485	0.628	0.818
SurgeryChemo	-0.199	0.382	-0.522	0.602	0.819	0.388	1.731	-0.126	0.385	-0.326	0.744	0.882
SurgeryRadio	-1.470	0.595	-2.471	*0.013*	0.230	0.072	0.738	-1.147	0.590	-1.945	*0.052*	0.318
The follow-up time												
3 - 6m												
6 - 9m	0.465	0.464	1.003	0.316	1.592	0.641	3.954	0.229	0.465	0.492	0.623	1.257
9 - 12m	1.339	0.637	2.102	*0.036*	3.816	1.095	13.302	1.644	0.648	2.537	*0.011*	5.178
12 - 18m	1.161	0.443	2.619	*0.009*	3.194	1.339	7.617	0.869	0.440	1.975	*0.048*	2.385
18 - 24m	1.140	0.456	2.497	*0.013*	3.126	1.278	7.647	0.684	0.453	1.509	0.131	1.981
worst | worse	-0.973	0.473	-2.056	*0.040*	0.378	0.149	0.956	-0.898	0.476	-1.888	0.059	0.407
worse | normal	0.614	0.470	1.306	0.192	1.847	0.735	4.639	0.995	0.476	2.092	*0.036*	2.704

Figures

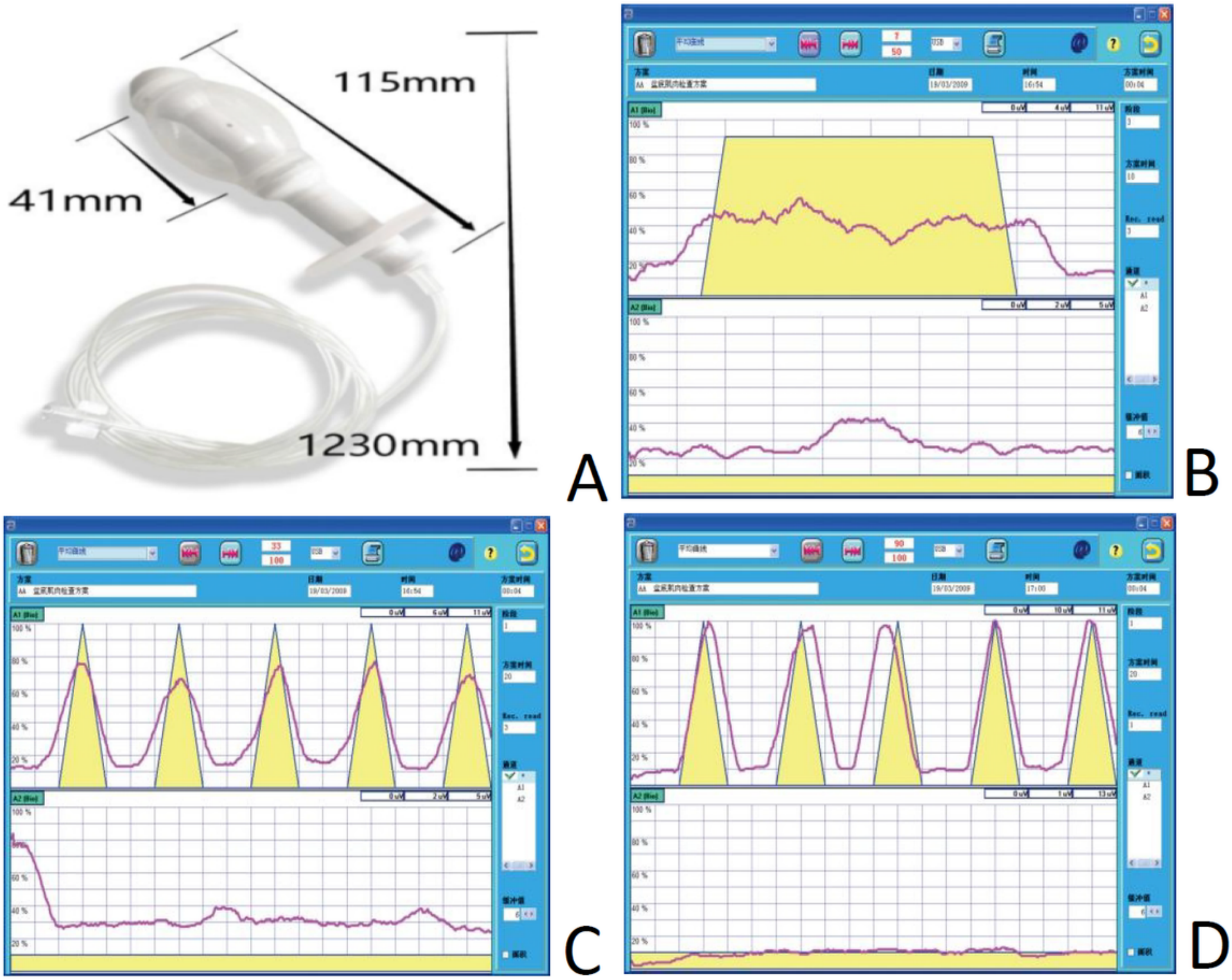

Figure 1

Vaginal pressure probe,MFSI,MFSⅡA,MFSⅡB A.Vaginal pressure probe B.The strength of type I muscle fibre(MFSI):level 5 C.The strength of type ⅡA muscle fibre(MFSⅡA):level 5 D.The strength of type ⅡB muscle fibre(MFSⅡB):level

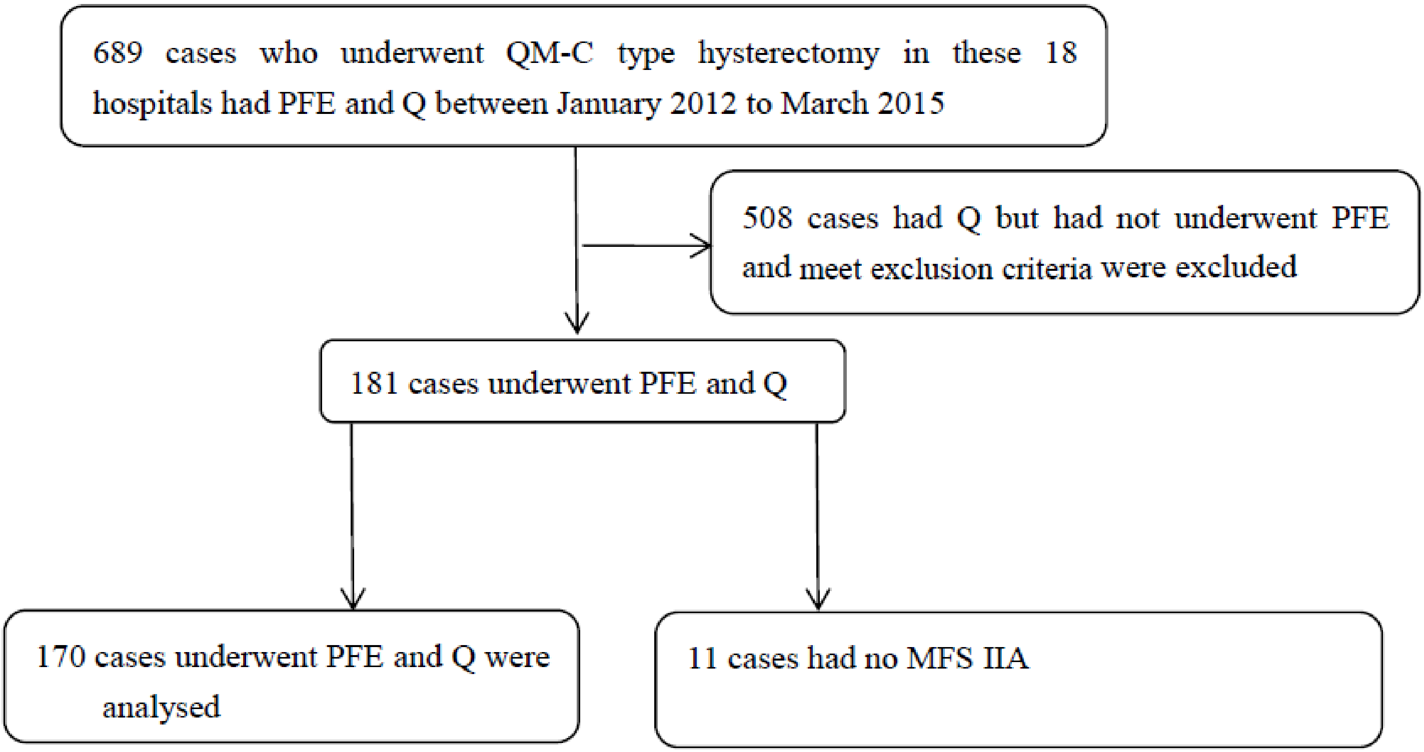

Figure 2

Flowchart of this study.PFE:pelvic floor examination;Q:questionnarie;MFS IIA:type IIA muscle fibre strength

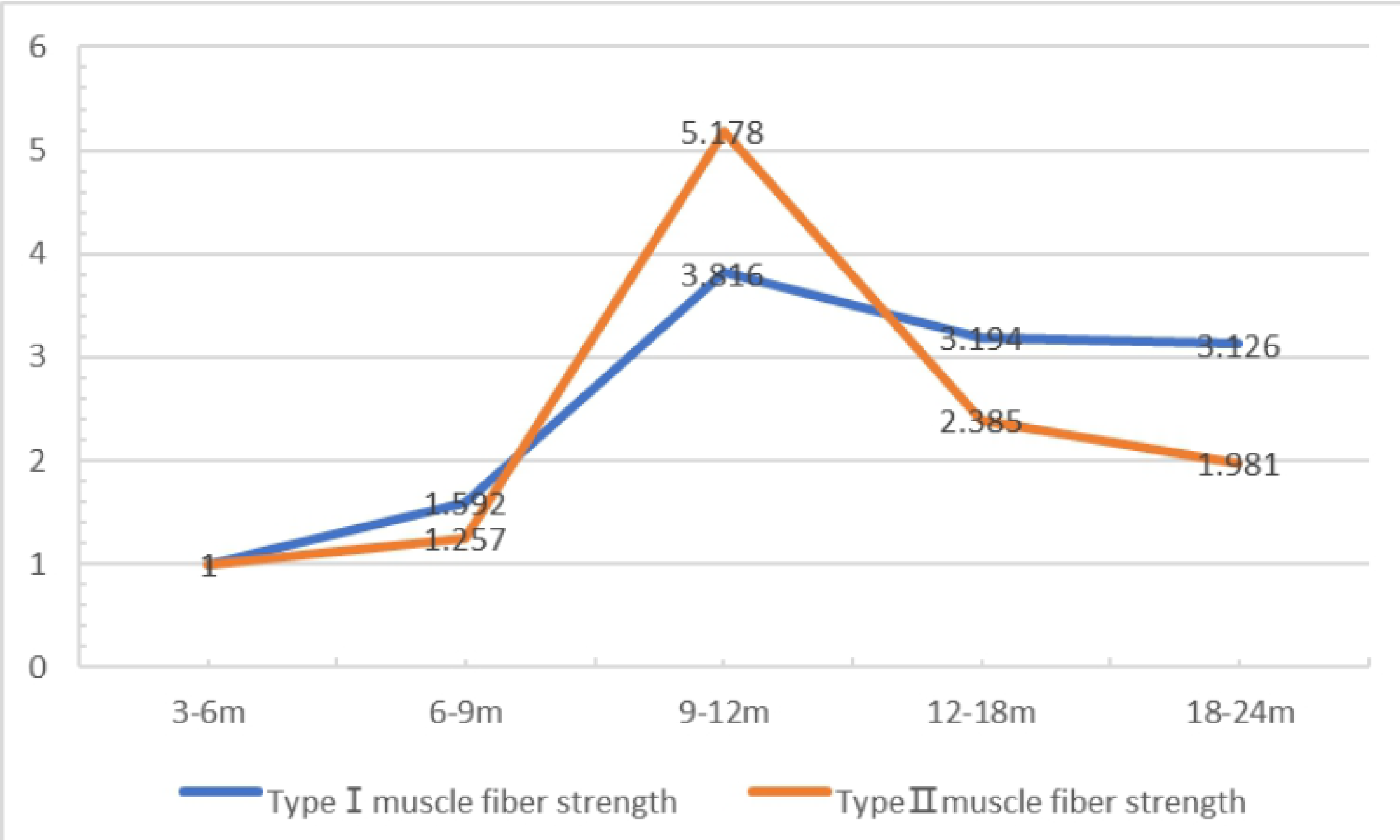

Figure 3

Comparison of muscle strength half a year after operation with that of 3-6 months after operation.For type muscle fiber,6-9 months,9-12 months,12-18 months,18-24 months after operation was 1.592 times(P>0.05),3.816 times(P<0.05),3.194times(P<0.05),3.126times(P<0.05) than 3-6 months after operation.For type muscle fiber,6-9 months,9-12 months,12-18 months,18-24 months after operation was 1.257 times(P>0.05),5.178 times(P<0.05),2.385 times(P<0.05),1.981 times(P>0.05) than 3-6 months after operation.