Physical therapeutic elements

in stage medical recovery of puerperas

Elementos fisioterapéuticos en etapa de recuperación médica de las puerperas

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Resumen

Objetivo: el objetivo principal del estudio es evaluar el papel de los elementos fisioterapéuticos en la recuperación médica por etapas de las puérperas. Materiales y Métodos: para cumplir con ese objetivo, se realizó una investigación comparativa del puerperio en 154 puérperas con lesiones perineales tras extracción con ventosa fetal. Resultados: Con base en los resultados obtenidos, se puede concluir que la fisioterapia escalonada proporcionó un incremento en la fuerza de los músculos del suelo pélvico en los casos del grupo líder en aproximadamente un 47,9% (p <0,01), el grupo experimental - en un 36,2% (p <0,01) y el control - en un 24,4% (p <0,05); una caída en el número de complicaciones postoperatorias fue de 6,5, 4,6 y 2,63 veces, a su vez. Conclusión: el uso de fisioterapia escalonada en puérperas con heridas perineales después de operaciones de parto otorga un avance estadísticamente sustancial en los parámetros clínicos y funcionales en comparación con el uso solo del tratamiento estándar y su combinación con NMLT.

Palabras clave: puérperas, estimulación magnética, radiación láser, heridas perineales, ventosa fetal.

Abstract

Objective: the study's main aim is to evaluate the role of physical therapeutic elements in the staged medical recovery of puerperas. Materials and Methods: to satisfy that aim, a comparative investigation of the postpartum period was conducted in 154 puerperas with perineal injuries following fetal vacuum extraction. Results: Based on the results obtained, it can be concluded that Staged physiotherapy provided a rise in the strength of the pelvic floor muscles in cases of the leading group by roughly 47.9% (p<0.01), the experimental group - by 36.2% (p<0.01), and control - by 24.4% (p <0.05); a drop in the number of postoperative complications was by 6.5, 4.6, and 2.63 times, in turn. Conclusion: utilizing staged physiotherapy in puerperas with perineal wounds after delivery operations bestow a statistically substantial advancement in clinical and functional parameters as opposed to using only standard treatment and its combination with NMLT.

Keywords: postpartum women, magnetic stimulation, laser radiation, perineal wounds, fetal vacuum extraction.

Introduction

One of the key challenges to modern obstetrics is to ensure a favorable outcome of pregnancy and childbirth for the mother and her newborn[1]. Recent years have been characterized by the desire of obstetricians and gynecologists to replace any vaginal delivery operation or allowance for a cesarean section, the incidence of which in Russia in 2017 reached 25%, in the Kabardino-Balkarian Republic - 29.8%[2-5].

According to various authors, purulent-septic complications after delivery operations are more common than after spontaneous delivery, amounting to 13-54%, which is due to reduced immunoreactivity of the birth canal in the presence of inflammatory diseases of the reproductive tract in a pregnant woman, extragenital pathology, constant infection perineal skin microbial flora of the vagina and rectum, the presence of obstetric complications during pregnancy, physiological immunodeficiency in puerperas and other factors[6-9]. The risk of suppuration of the perineal wound and the burdened course of its healing in women with a high infectious index reaches 85% with a combination of several infectious factors - 91%.

The use of a vacuum extractor reduces the incidence of perineal dissection in combination with its ruptures during childbirth up to 12-40%[10,11].

The high incidence of perineal injuries in postpartum women after fetal vacuum extraction (FVE) served in general as the basis for the development of new methods of medical rehabilitation[12]. Among the unconventional polyvalent treatment methods, low-intensity magnetic laser radiation (LLLT) and electromagnetic stimulation (EMS) are gaining popularity[13-16]. The data of several researchers indicate that the magnetic field and laser radiation have the same therapeutic effects (reparative-regenerative, anti-inflammatory, analgesic, anti-edematous, immunomodulating, antispastic and antihypoxic), which suggests their synergism when used simultaneously[17,18].

Currently, a system of extracorporeal magnetic stimulation of the neuromuscular apparatus of the pelvic floor has been developed - a highly effective non-invasive method for treating several pelvic diseases in men and women[8,19]. EMS of the neuromuscular apparatus of the pelvic floor causes not only stimulation and training of muscle structures but also stimulation of the nerve structures of the segmental apparatus of the spinal cord. The application of those mentioned above medical, physical factors in restoring the standard anatomical structure of the female external genital organs is of scientific interest[17-20].

Materials and Methods

Clinical studies and collection of material were carried out in 2012-2020 in the maternity ward of FBHI Perinatal Center Branch No. 2. Following the tasks set, a comparative analysis of the postpartum period was carried out in 154 puerperas, delivered by fetal vacuum extraction, with spontaneous injuries. Inclusion criteria: postpartum women with perineal injuries (episiotomy, perineotomy, perineal rupture) after using the vacuum extraction of the fetus; age 21-36 years; informed, voluntary consent; personal data processing consent. Exclusion criteria: general contraindications for physiotherapy; severe extragenital and obstetric pathology; tumors of the pelvic organs.

Depending on the therapy, the puerperas were divided into three groups by simple randomization. The first main group of patients (M.G.; 49 people) received staged rehabilitation treatment, including: at the inpatient stage - standard drug therapy (non-steroidal anti-inflammatory drugs - diclofenac sodium (Hemofarm LLC, (Russia), 1 suppository rectally, 1 time per day), for 3 days); perineal wound treatment with a 3% solution of hydrogen peroxide and dressing with Levomecol, daily; starting from the 1st day after delivery, NMLT was performed using the RIKTA-ESMIL(1A) apparatus on the perineal wound after its treatment with 0.05% chlorhexidine bigluconate solution through a two-layer gauze dressing, while the postoperative suture was scanned from the periphery to the center with the capture of the edges by 2-3 cm, the radiator was kept 0.5-1 cm from the wound surface, with a variable frequency at the rate of 2 min per 10 cm^2, daily, 5 sessions per course of treatment; at the outpatient stage - starting from the 15th day after surgical delivery, EMS of the neuromuscular apparatus of the pelvic floor was performed using the Avantron apparatus, patient's position – seated in the center of an electromagnetic chair, the exposure frequency was 10 Hz the first 10 minutes, 50 Hz next 10 minutes; 3 sessions per week, 7-8 sessions per course of treatment. Patients in the experimental group (E.G., 51 women) received rehabilitation treatment only at the inpatient stage and were prescribed standard drug therapy and NMLT according to the same scheme as in the M.G. Patients of the third control group (C.G.; 54 women) were prescribed only standard treatment at the inpatient stage.

The material was collected in compliance with the rules of bioethics and signed patient informed consent and personal data processing consent.

The studies were carried out on the day of delivery, upon discharge from the obstetric hospital, 1, 6, and 12 months after operative delivery. The visual analog scale (VAS) was used to assess pain and asthenoneurotic syndromes in points from 0 to 10 points, from absence to extremely severe clinical manifestations. Pelvic floor muscle strength was assessed by finger examination on the Oxford scale from 0 (no contraction of the pelvic floor muscles) to 5 points (very strong muscle contraction force and dynamometry of the pelvic floor muscles using Vagiton pneumo simulator (Russia). Statistical processing of the material was in Microsoft EXCEL 2010 (Microsoft Corp., USA) and R version 3.3.2 (2016-10-31). Comparison of samples by quantitative criteria was carried out using Student's test. The critical level of significance when statistical testing hypotheses in this study were taken equal to 0.05.

Results and Discussion

The analysis of clinical symptoms, carried out in a comparative aspect, proved the feasibility of NMLT for the perineal wound from day one after delivery. Puerperas of M.G. and, E.G. showed a significant decrease in the intensity of pain syndrome by 38.0% ($p<0.01$) and 34.4% ($p<0.01$), respectively. This was accompanied by a decrease in the manifestations of asthenoneurotic syndrome - by 41.6% ($p<0.01$) and 41.1% ($p<0.01$), respectively. In C.G. patients who received only standard treatment, the decrease in the severity of pain and asthenoneurotic syndromes was statistically significantly less pronounced, but significantly significant in relation to the data before treatment: by 19.5% ($p<0.05$) and 28.8% ($p<0.05$), respectively.

The analysis of the course of the postpartum period revealed that patients of M.G. and, E.G. did not have a temperature reaction during the recovery period after delivery. In the C.G., where only standard treatment was used, a subfebrile temperature reaction was observed up to 3 days in 16.7% of cases (3 patients). At the same time, there were no significant differences in the level of decrease in body temperature between the groups.

We assessed the condition of the perineal wound: the presence of hyperemia, swelling of the seams, the degree of formation of granulation tissue. In patients of M.G. and, E.G., wound healed by primary intention in 98% of cases, and only in 1 (2.0%)

puerpera of M.G. and 1 (1.9%) puerpera of, E.G., had partial dehiscence of the perineal sutures. 33 (67.3%) puerperas of M.G. and 35 (68.6%) puerperas of, E.G., reported the absence of pain in the perineal wound at rest and while walking, free, painless urination and defecation after 1-2 sessions of NMLT; the rest of the women indicated slight soreness, which was stopped after 3-4 sessions of NMLT. In the C.G., 5 (9.3%) puerperas had suppuration of the perineal wound with suture divergence, and 21 (38.9%) had edema of the perineal sutures. 41 (75.9%) puerperas of C.G. noted moderate soreness in the area of the perineal sutures, 10 (18.5%) - severe pain and discomfort when walking 4-5 days after birth. The timing of the reduction of clinical symptoms deserves special attention. Thus, NMLT contributed to a smoother course of the wound process: patients of M.G. and, E.G., noted a leveling of pain syndrome, a significant decrease in edema and hyperemia of the perineal wound already on day 2-3 after birth, while in the C.G. - on day 3-4.

On day 29-30, the intensity of pain syndrome in postpartum women of MG decreased by 66.0% ($p<0.01$), asthenoneurotic - by 72.0% ($p<0.01$), EG - by 55.8% ($p<0.01$) and 56.9% ($p<0.01$), and CG - by 44.4% ($p<0.01$) and 39.3% ($p<0.01$), respectively. It should be noted that the pronounced analgesic, anti-inflammatory, and regenerative effects of NMLT caused a statistically significant difference in the dynamics of these clinical indicators compared to the C.G.[5,16].

The use of staged physiotherapy significantly affected the perineal wound's condition because the effect of EMS, based on electrical stimulation of muscle tissue, provides «training» of the pelvic floor muscles, leading to their strengthening[2,8]. Stimulation of muscle tissue and increased blood supply to the periurethral area stimulates wound epithelialization and the formation of elastic and strong connective tissue. When assessing the state of the perineal wound in patients with M.G., wound healing was noted in 100% of cases. The use of staged physiotherapy provided a significant analgesic effect - all puerperas of M.G. noted the absence of pain in the perineal wound at rest and while walking, free, painless urination and defecation, which contributed to the improvement of their psycho-emotional status ($r = +0.64$; $p<0.001$). In, E.G., 2 (3.92%) puerperas had moderately pronounced swelling of the perineal sutures, and pain in the perineal wound area, mainly when walking, persisted on day 29-30 in 5 (9.80%) puerperas. In C.G., 8 (14.81%) patients, mainly those who had suppuration of the perineal wound with suture divergence on day 5-6, also had moderately pronounced edema of the perineal sutures. Moreover, in 4 puerperas with suppuration of wounds, healing occurred only after 12.2±0.56 days of treatment. In 15 (27.8%) puerperas, moderate soreness in the area of sutures on the perineum, pain, and discomfort when walking remained.

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Table 1. Changes in clinical indicators in puerperas after FVE

Indicators	Period	MG (n=49) c±m	EG (n=51) c±m	CG (n=54) c±m
Pain syndrome (points)	day 1	1.71±0.07	1.63±0.03	1.69±0.05
	day 5	1.06±0.04**"	1.07±0.02**"	1.36±0.07*
	day 29-30	0.58±0.05**"	0.72±0.04**	0.94±0.06**
Asthenoneurotic syndrome (points)	day 1	1.61±0.04	1.58±0.06	1.63±0.08
	day 5	0.94±0.02**"	0.93±0.05**"	1.16±0.07*
	day 29-30	0.45±0.03**"	0.68±0.04**"	0.99±0.03**

Note: * and ** - statistically significant difference between indicators and data before treatment $p<0.05$ and $p<0.01$, respectively; " - statistically significant difference between indicators and data in the C.G. - $p<0.05$.

The most obvious advantage of staged physiotherapy with the use of NMLT and EMS was proved by the changes in indicators of the state of the pelvic floor muscle tone on days 29-30. Thus, in the M.G., in comparison with the initial data with combination staged physiotherapy, the strength of the pelvic floor muscles in digital examination increased by 28.5% ($p<0.01$), in, E.G., when using only standard therapy and NMLT - by 17.7% ($p<0.05$), while in C.G., with standard therapy only, only a tendency to an increase in the tone of the pelvic floor muscles was noted. Dynamometry of the pelvic floor muscles showed that the strength of muscle contractions in M.G. increased by 67.4% ($p<0.01$), in E.G., by 54.7% ($p<0.01$), and in C.G. - by 35.2% ($p<0.05$). The conducted matrix correlation analysis showed that a statistically significant improvement in the condition of the pelvic floor muscles correlates with a high degree of reliability with an improvement in QOL ($r = +0.66$; $p<0.001$).

Table 2. Changes in indicators of the state of the pelvic floor muscles

Indicators	Period	MG (n=30)	EG (n=30)	CG (n=30)
Pelvic floor muscle contraction force F (mmHg)	day 1	40.8±2.63	42.4±2.51	41.8±2.36
	day 29-30	57.1±2.72**	51.5±2.27*	48.3±2.18
Oxford scale (points)	day 1	1.16±0.19	1.24±0.11	1.27±0.14
	day 29-30	3.56±0.21**	2.74±0.32*	1.96±0.33*

Note: * and ** - statistically significant difference between indicators and data before treatment $p<0.05$ and $p<0.01$, respectively; " - statistically significant difference between indicators and data in the C.G. - $p<0.05$.

The lowest incidence of postoperative complications after 6 and 12 months was observed in patients of M.G. who received staged physiotherapy as part of medical rehabilitation: after six months - 13 (43.3%), and by the end of the year - only 2 (6.67%). In EG - after 6 months the incidence was 23 (76.7%), and after 12 months - 5 (16.67%); in CG - after 6 months - 29 (96.7%) and after 12 months - 11 (36.7%). This again confirms that the use of EMS, based on electrical stimulation of muscle tissue, causes the restoration of the normal anatomical structure of the female external genital organs, thereby contributing to the leveling of complications[2,4,8,12].

In general, this study shows that the developed technique has a high therapeutic efficacy achieved due to the synergism of the therapeutic effects of NMLT and EMS: reparative-regenerative, anti-inflammatory, analgesic, therapeutic effects of NMLT, and the positive effect of EMS on the pelvic floor muscle tone provide faster restoration of the normal anatomical structure of the female external genital organs.

Thus, our program of medical rehabilitation of puerperas with perineal wounds after delivery operations with the use of staged physiotherapy (NMLT followed by EMS) provides a statistically significant improvement in clinical and functional parameters compared to the use of only standard treatment and its combination with NMLT.

Conclusion

The inclusion of low-intensity magnetic laser radiation in the standard set of medical rehabilitation of puerperas with perineal injuries after fetal vacuum extraction (main and experimental group) significantly increases the effectiveness of rehabilitation measures, which is manifested in a decrease in the intensity of pain syndrome on average by 36.2% ($p < 0.01$), asthenoneurotic - by 41.4% ($p<0.01$), debridement of the perineal wound in 98% of cases. This leads to a leveling of pain syndrome and a decrease in edema and hyperemia of the perineal wound on days 2-3 after childbirth and provides a reduction in the length of stay in the maternity hospital by 1.5 days in comparison with the use of standard treatment (control group).

The use of staged physiotherapy - magnetic laser exposure followed by extracorporeal magnetic stimulation against the background of standard therapy in puerperas with perineal injuries after fetal vacuum extraction contributes to an increase in the strength of the pelvic floor muscles by 47.9% ($p<0.01$), while using only standard therapy and magnetic laser exposure - by 36.2% ($p <0.01$), and only standard therapy - by 24.4% ($p <0.05$). This provides a faster restoration of the normal anatomical structure of the female external genital organs and contributes to the leveling of postoperative complications: in the main group, the decrease occurred 6.5 times, in the experimental group - 4.6 times, and in the control group - 2.63 times.

The use of staged physiotherapy - magnetic laser exposure followed by extracorporeal magnetic stimulation against the background of standard pharmacotherapy in puerperas with perineal injuries after fetal vacuum extraction provides a faster restoration of the normal anatomical structure of the female external genital organs and contributes to the leveling of postoperative complications: in the main group, the decrease occurred 6.5 times, in the experimental group - 4.6 times, and in the control group - 2.63 times.

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