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Research Article

The Benefits of Radical Laparoscopic Surgery and a Modified Endometriosis Health Profile-36 (EHP-36) on Quality of Life

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Abstract

Objective: This study investigates the outcomes for women up to 2 years after radical laparoscopic excision of endometriosis, and its effect on quality of life (QoL) and wellbeing using a modified Endometriosis Health Profile-36 questionnaire (EHP-36).

Design: A prospective cohort clinical study.

Setting: Robert Károly Hospital, Budapest, Hungary, Endoscopic Unit.

Population: Eighty-seven patients with proven investigative signs, symptoms and complaints of invasive endometriosis undergoing hysterolaparoscopic surgery in the hospital between 1 January 2017 and 31 December 2018.

Method: This study proscribes the use of questionnaires on patient's quality of life and wellbeing with postoperative

follow-up (for 6, 12 and 24 months).

Result: All 87 patients completed the questionnaires (response rate was 100%). Mean age was 34.2 ± 5.9 years; the average age of onset of endometriosis was 24.5 ± 5.710 years (15–37). The majority of patients (n = 65, 74.7%) were in stages III and IV. A total of 72 patients (82.76%) frequently described their pain as a pricking pain. The NRS-11 pain score reduced from 94.8% with moderate to severe pain preoperatively to 18.4% with mild pain postoperatively. There was a significant improvement in the QoL in this regard (p <0.001). The VAS pain score decreased from 8 ± 2.11 (86.0%) moderate to severe pain preoperatively to 0.47 ± 1.24 (93.1%) negligible to no pain postoperatively (p <0.001). 58.45% (32/61) of women with infertility, became pregnant, live birth was 77.4% (24/61). Perception of QoL before surgery as very bad in 89.6% (78/87) of women and the perception of QoL significantly improved in 93.1% (81/87) of women after surgery. General wellbeing was rated very low by 93.1% (81/87) of women before surgery. Postoperative general wellbeing rated very well or good in 94.2% (82/87) of women. Significant improvements observed in sexual life with 77.85% (75/87) and 74.7% (65/87) of women rating it as good or very good (p <0.001), respectively.

Conclusion: Meticulous individualized radical laparoscopic surgical intervention showed tremendous improvement in patient wellbeing and QoL.

Keywords: Endometriosis; Laparoscopic surgery; Infertility; EHP-36 Questionnaire; Quality of life

1. Introduction

Endometriosis is a proven chronic benign disease, with occasional malignant transformation affecting close to 2–17% of women in their reproductive years [1-4]. The pelvic organs are most frequently affected, although the literature has disclosed distant extra pelvic organ involvement, such as the lungs, skin, intestinal structures etc., except the spleen [5]. However, this assertion is contested by an animal model study conducted by Elham et al. in 2019, where using flow cytometry and immunofluorescence analysis demonstrated the presence of endometriosis-derived cells in multiple organs (including the lungs, spleen, liver and brain) in the murine model with endometriosis [6]. Endometriosis is characterized by pain-related symptoms (i.e., dysmenorrhea, dysuria, dyspareunia and dyschezia), with the capacity to threaten physical, psychological and socioeconomic wellbeing [7]. It is also presumed to be strongly associated with infertility by many pieces of literature [8]. Based on these facts, it is assumed to have a significantly adverse impact on the woman, the health care system and the respectful immediate environment. However, the management, diagnosis and aetiology are still uncertain and contested, causing a big challenge to the gynaecologist [9]. The economic burden is increasing as new cases of the disease are recorded daily, coupled with an increased cost in health care provisions [10-12]. In a study conducted by Winkel et al. [13] in the United States of America, they estimated $5805 for surgical cost and $2418 for medical cost.

This study excluded indirect costs as a result of reduced productivity while at work due to fatigue, chronic pain, and also time lost from complete absenteeism. Productivity lost could greatly influence the financial status of the family and will eventually affect the gross domestic product (GDP) of countries adversely, since a substantial number of

women in their early carrier ages are the most affected [12, 14]. Regardless of the socioeconomic implications involved or the complexity of the disease symptomatically, a diagnosis is always delayed, resulting in a long period of suffering of those individuals [7, 9, 12]. Most times the disease is uncovered during a workup investigating infertility, since an accurate diagnosis is often achieved during laparoscopy or laparotomy interventions [1, 12, 15]. Although the socioeconomic and physical burden of endometriosis is very high, the psychological-emotional components attached cannot be ignored. These emotional stresses are associated with dyspareunia, infertility (which reduces the self-esteem of women) and disrespect by peers and family members and often cause broken homes, which could eventually lead to severe depression. A study conducted by Berek et al. [16] reported that endometriosis was associated with chronic lower abdominal pain in 20–90% of women presenting with chronic lower abdominal pain, while more than 30–50% of women with unexplained infertility exhibited involvement of the disease at various stages. A study conducted by Fadhlaoui reported that the prevalence of endometriosis rose to 50% in women with infertility [17, 18].

2. Material and Methods

2.1 Study design

This is a cross-sectional prospective study.

2.2 Place and duration of the study

The study was performed from January 2016 to December 2018 at the Department of Gynaecology and Obstetrics at Robert Károly Private Hospital.

2.3 Recruitment and study population

A total of 87 consecutive premenopausal women aged 18–45 years attending the Ob/Gyn clinics with symptoms and complaints related to endometriosis, such as endometriosis-associated chronic pelvic pain (EACPP), dysmenorrhea, dyspareunia, and or subfertility who were scheduled for laparoscopic surgery were recruited prospectively to participate in the study. The patients were asked to fulfil the 116-item questionnaire in their language with the assistance of a trained medical supervisor. Women were also contacted later to complete a follow-up 10-item questionnaire strictly about their post-surgical emotional perception. Women also made their contacts available, which included email addresses and telephone numbers.

2.4 Exclusion criteria

- Women with a previous surgical diagnosis of endometriosis
- Patients beyond the age limits
- Patients suffering from any form of chronic illness
- Patients with a psychological disorder
- Patients who decline to participate in the study
- Patient with polycystic ovarium disease (PCOD), pelvic inflammatory disease (PID); major medical conditions; neurological and psychiatric disorders; history of gastrointestinal, urological, or orthopaedic diseases; and current use of drugs affecting cognition and mood.

2.5 Questionnaires

The administered questionnaires were multifocal, with components such as the Endometriosis Health Profile-36 (EHP-36), visual analogue scale (VAS), Numeric Rating Scale (NRS-11), general characteristics, and other information (i.e., lifestyle, nutrition and genetic exposure) incorporated in the questionnaires. The EHP-36) questionnaire is used to measure demographics, physical and mental health, emotional problems, and general perception of health and quality of life (QoL). The VAS and NRS-11 were employed to measure painful distress associated with the endometriosis. Other complementary information was included, which was used to test for a possible association of lifestyle, nutrition, and genetic exposure. The questionnaire was pretested using some voluntary hospital staff nurses to complete it, and the average time was noted.

2.6 Methods

A total of 87 women agreed to enter the study. They were recruited after signing written informed consent for the surgery and completing the questionnaire. Women were asked to make their contacts available, which included email address and telephone numbers, which they willingly provided. Further investigations including gynaecological examination; pelvic transvaginal ultrasonography; MRI, CT, cystoscopy etc., when indicated; and critical medical patient history were prepared for diagnostic and operative laparoscopies [19]. The study period lasted from January 2017 through December 2018, when the surgeries and questionnaires were completed. Validated instruments were used to assess the QoL, including the EHP-36 (a questionnaire used to measure demographics and physical, mental and socioeconomic wellbeing). The VAS and NRS-11 were employed to measure painful distress. Additional information also included investigating any association with lifestyle, nutrition and genetic exposure with the endometriosis in the questionnaires, which was completed preoperatively. The VAS is a 10-point scale, while the NRS-11 is an 11-point scale for patient self-reporting of pain for endometriosis-related painful symptoms (i.e., dyspareunia, dysChezia, non-menstrual pelvic pain, and dysmenorrhea). We commenced with 0 representing no pain and 10 representing the most miserable painful stress. None of the patients received preoperative adjuvant therapy, such as hormonal treatment. All the patients underwent radical laparoscopic surgery, depending on the degree of damage, stages, and desire. Those with infertility or subfertility issues had a combined hysterolaparoscopic procedure, with a dye test.

The stage of endometriosis was determined intraoperatively, and the disease severity was staged using the revised American Fertility Society (rAFS) classification: I (minimal), II (mild), III (moderate), or IV (severe) [20]. Postoperative follow-up was performed at 6 months, 12 months and 24 months later by postal questionnaire using the electronic platform (email) and by direct telephone conversation. The post-surgical questionnaire was dispatched on different occasions depending on the date of surgery, and each patient was followed-up for a maximum of 24 months. Further checks were also introduced by revisiting patient medical records in the hospital database on control to confirm information retrieved directly from the completed questionnaires. The essence of control at a different period is with the hope to demonstrate any positive impact on the wellbeing of women after radical laparoscopy surgery for endometriosis. During the follow-up period, we evaluated their symptoms and complaints, including chronic pelvic pain, dysmenorrhea, dyspareunia, dysuria, dysChezia and infertility, as well as their general wellbeing.

2.7 Consent

The purpose of the study was explained to all participants, and written and oral informed consent was obtained.

2.8 Ethical approval

The study protocol was approved by the Ethical Committee of the Robert Károly Private Hospital, Budapest, Hungary.

2.9 Data management

We used chi-square analyses and Fisher exact tests to study categoric variables in the Stata program (v.11). We investigated continuous variables using independent-sample *t-test* or non-parametric Mann-Whitney *U* test as appropriate. Multiple logistic and linear regression analyses were used to study associations between variables and outcomes, adjusting for potential confounders independently associated with exposure and outcome of interest in univariate analysis. A p-value < 0.05 was considered nominally significant.

3. Result

A total of 87 patients was enrolled in this study. They completed the modified EHP-36 questionnaire and underwent laparoscopic surgical procedures, with a follow-up of at least 24 months. The epidemiological characteristics of the patients studied were as follows: mean age at diagnosis 34.2 ± 5.97 years (with a minimum age of 22 and a maximum age of 48), duration of infertility 3.8 ± 2.1 years and average duration between symptoms to diagnosis 9.7 ± 0.35 years. All Caucasians, a minimum of completing a higher level of education, a higher income category and nulliparous women accounted for 81.6% of patients. The most prevalent complaints/symptoms reported included infertility issues (70.1%), dysmenorrhea (82.8%), dyspareunia (60.9%), abdominal bloating (93.1%) and urinary disorders (49.4%).

Table 1 illustrates general information on the patients in the study. The left ovary was the most affected single organ (42.5%). Additionally, there was involvement of the rectovaginal septum (55.2%), including infiltrating endometriosis, and superficial peritoneal implants (66.7%). The third stage of endometriosis was the most frequent finding (48.3%). Surgical interventions included adhesiolysis (70.1%) and bladder resection (9.2%). Post-surgical evaluations revealed spontaneous pregnancy achieved in 37.7% of patients and IVF-ET in 14.1% of patients with a live birth rate of 75.0%. The mean pain score using the NRS-11 preoperatively revealed 94.8% of patients had moderate to severe pain. Post-surgical pain perception improved to 81.6%, as patients reported none or insignificant periodic discomfort. The VAS before surgery revealed 94.3% of patients had moderate to severe pain. In the postoperative VASs during follow-up, pain declined tremendously, with 93.1% of patients reporting minimal to no pain at all. The completion rate by the participants was 100%, except the three cases where the monitoring of their pregnancy was discontinued in the middle of the pregnancy due to relocation.

Table 2 and Figure 1 illustrates the possible psychoemotional impact on women, during the presurgical and postsurgical periods calculated in a numerical form (scores from 1–10), with 1 representing less of an emotional effect and 10 representing a severe emotional effect on an individual. In the postsurgical analysis, all the patients

reported significant changes and improvements in their lives (all the MANOVA tests revealed a significant decrease in all the disturbing negative feelings and symptoms associated with endometriosis ($p = 0.001$)). Figure 2 demonstrates the pain rating scores using the NRS-11 and VAS. As the Mauchly variance homogeneity test proved heteroscedasticity (chi-squared (5) = 113.835, $p < 0.001$)), we used the MANOVA for testing the differences among the changes in pain rating scores over time, which prove significant decreases in all forms of pain after the surgery.

Figure 3 demonstrates fertility performance after the surgical procedures, which shows significant improvement throughout the follow-up period. The ratio of spontaneous pregnancy increased from 6 months to 12 months of follow-up (chi-squared = 15.94, $p = 0.001$). This increase also continued from 12 months to 24 months of follow-up (chi-squared = 9.07, $p = 0.028$). Generally, there was a consistent increase in the ratio of spontaneous pregnancy from 6 months to 24 months of follow-up (chi-squared = 41.34, $p < 0.001$). Table 3 demonstrates the different types of pain-associated distress encountered by women with endometriosis. The most frequent was pricking pain/discomfort, while the least frequent was rectal bleeding ($p = 0.001$). Figure 4 is an illustration of women's assessments of their lives before and after the surgery. Table 4 and Figure 4 shows a tremendous improvement in all previous negative indices of their lives ($p < 0.001$), while Table 4 shows the outcome of women's QoL as the follow-up period progresses. As the Mauchly variance homogeneity test proved heteroscedasticity (chi-squared (5) = 103.08, $p < 0.001$), we used the MANOVA for testing the differences among the QoL changes over time. The MANOVA tests showed significant increases in QoL after the surgery.

General characteristics of women with endometriosis in this study (n=87)			
Mean age at menarche (years)		13.2 ± 1.293 years (9–17)	
Mean age at diagnosis of endometriosis		34.2 ± 5.97 years (20–48)	
Mean age at the onset of symptoms relating to endometriosis		24.5 ± 5.710 years (15–37)	
Duration of infertility		3.8 ± 2.1 years	
Duration of symptoms before diagnosis		9.7 ± 0.35 years	
Characteristics	**Type**	**Number (n)**	**Percentage (%)**
Localization of endometriosis	Superficial/deep left ovary involvement	37	42.6%
	Deep right ovary involvement	14	16.2%
	Both right and left ovary involvement	27	31.0%
	Superficial (RVS)/deep rectovaginal septum involvement	62	71.3%
	Superficial bladder involvement	48	55.2%
	Deep bladder involvement	10	11.5%
	Intestinal involvement	13	14.9%
	Superficial peritoneal involvement	58	66.7%
	Adenomyosis	10	11.5%
Other surgical procedures	Adhesiolysis	61	70.1%

	Bladder resection	8	9.2%
	Dixon operation	2	2.3%
	Relapse of endometriosis	5	5.7%
Stage of endometriosis	Stage 1	3	4.9%
	Stage 2	12	19.7%
	Stage 3	29	47.5%
	Stage 4	17	27.9%
Other complication	Endometroid carcinoma	1	1.6%
Fertility	Infertility issue preoperational	61	70.1%
Mode of pregnancy	Spontaneous pregnancy	23	37.7%
	IVF-ET	9	14.1%
Outcome of pregnancy	Spontaneous delivery	17	53.1%
	Caesarean section	7	21.9%
	Missed abortion	4	12.5%
	Lost to follow-up	3	9.4%
Preoperative pain score (NRS-11)	Moderate to severe pain	85	94.8%
Postoperative pain score (NRS-11)	Mild to zero pain	71	81.6%
Preoperative VAS score	Moderate to severe pain	82	94.3%
Postoperative VAS score	Minimal to zero pain	81	93.1%
Additional factors	Family history of endometriosis	**	15.0%
	High red meat/fish	**	***
	Cigar rate (≥ 5 sticks/day)	17	19.5%
	Alcohol consumption (beer/wine regularly)	8	9.2%
	Alcohol consumption (gin/whiskey regularly)	14	16.1%
	Coffee consumption > 1 cup/daily	29	33.5%
Menstruation history	Bleeding disorder (metrorrhagia)	57	66.0%
	Cycles dysfunction (spotting bleeding)	43	49%
Miscellaneous issues	Use of sanitary napkins (solely to more regularly)	63	72%

Table 1: General characteristics of women before and after surgery follow-up (6, 12 and 24 months) (n=87).

Emotion	**Test**	**Value**	**F**	**Hypothesis df**	**Error df**	**Sig.**
Exhausting emotionally	Pillai's Trace	0.871	189.285	3	84	<0.001
	Wilks' Lambda	0.129	189.285	3	84	<0.001
	Hotelling's Trace	6.760	189.285	3	84	<0.001
	Roy's Largest Root	6.760	189.285	3	84	<0.001

Sickening emotionally	Pillai's Trace	0.725	73.854	3	84	<0.001
	Wilks' Lambda	0.275	73.854	3	84	<0.001
	Hotelling's Trace	2.638	73.854	3	84	<0.001
	Roy's Largest Root	2.638	73.854	3	84	<0.001
Unbearable emotionally	Pillai's Trace	0.883	211.495	3	84	<0.001
	Wilks' Lambda	0.117	211.495	3	84	<0.001
	Hotelling's Trace	7.553	211.495	3	84	<0.001
	Roy's Largest Root	7.553	211.495	3	84	<0.001
Miserable emotionally	Pillai's Trace	0.864	176.230	3	83	<0.001
	Wilks' Lambda	0.136	176.230	3	83	<0.001
	Hotelling's Trace	6.370	176.230	3	83	<0.001
	Roy's Largest Root	6.370	176.230	3	83	<0.001
Torturing emotionally	Pillai's Trace	0.885	215.733	3	84	<0.001
	Wilks' Lambda	0.115	215.733	3	84	<0.001
	Hotelling's Trace	7.705	215.733	3	84	<0.001
	Roy's Largest Root	7.705	215.733	3	84	<0.001
Depressing emotionally	Pillai's Trace	0.877	198.814	3	84	<0.001
	Wilks' Lambda	0.123	198.814	3	84	<0.001
	Hotelling's Trace	7.101	198.814	3	84	<0.001
	Roy's Largest Root	7.101	198.814	3	84	<0.001
Affect your work negatively	Pillai's Trace	0.835	141.547	3	84	<0.001
	Wilks' Lambda	0.165	141.547	3	84	<0.001
	Hotelling's Trace	5.055	141.547	3	84	<0.001
	Roy's Largest Root	5.055	141.547	3	84	<0.001
Affect your learning negatively	Pillai's Trace	0.812	121.096	3	84	<0.001
	Wilks' Lambda	0.188	121.096	3	84	<0.001
	Hotelling's Trace	4.325	121.096	3	84	<0.001
	Roy's Largest Root	4.325	121.096	3	84	<0.001

As all the Mauchly variance homogeneity test proved heteroscedasticity, we have used MANOVA for testing the differences among the changes in emotions over time. All tests had significant decreases of all depressing problems and emotions after the surgery.

Table 2: Comparison of emotional assessment of individuals before and after surgery according to timing of the follow-up (6, 12 and 24 months).

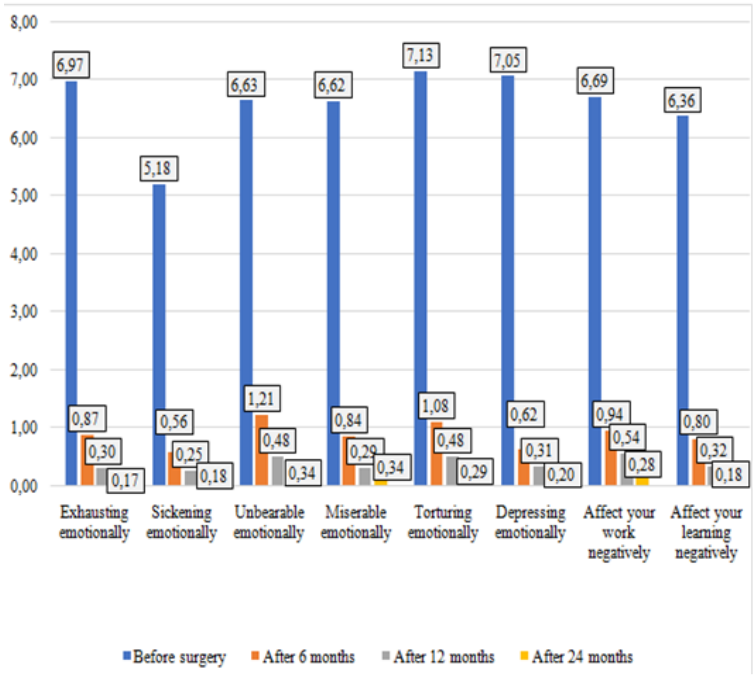
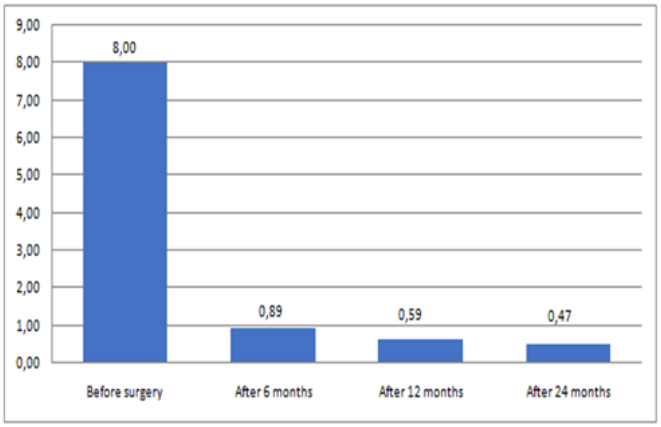


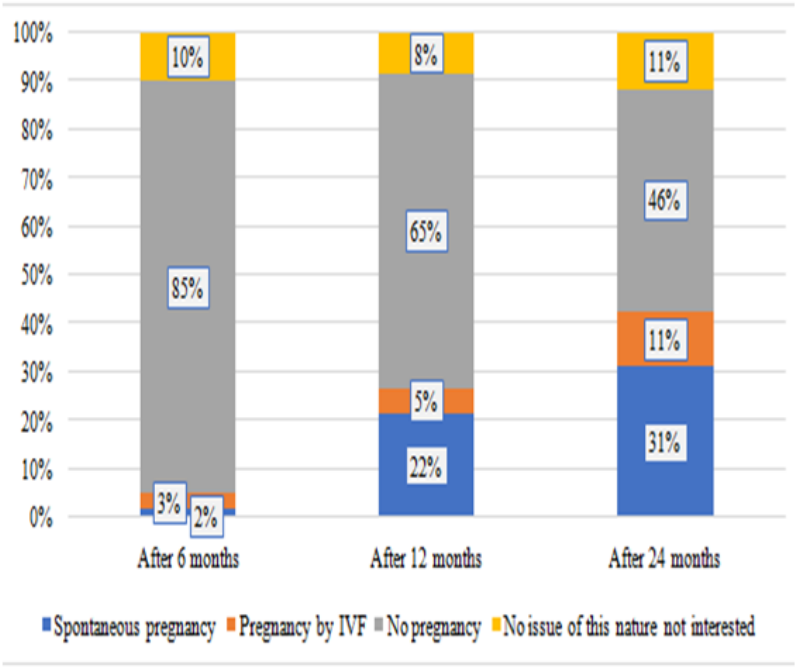
Figure 1: Comparison of emotional impact assessment of individuals before and after surgery according to timing of the follow-up (6, 12 and 24 months).



Multivariate Tests	Value	F	Hypothesis df	Error df	Sig.
Pillai's Trace	0.933	391.797b	3	84	<0.001
Wilks' Lambda	0.067	391.797b	3	84	<0.001
Hotelling's Trace	13.993	391.797b	3	84	<0.001
Roy's Largest Root	13.993	391.797b	3	84	<0.001

As the nauchly variance homogeneity test proved heteroscedasticity (chi-squared (5)=113.835, p0.001), we also used MANOVA for testing the differences among the changes in the pain rating scores over time. The MANOVA tests showed the significant decrease of all pain after the surgery.

Figure 2: Comparison of NRS-11 and VAS scores before and after sugery according to timing of the follow-up (6, 12 and 24 months).



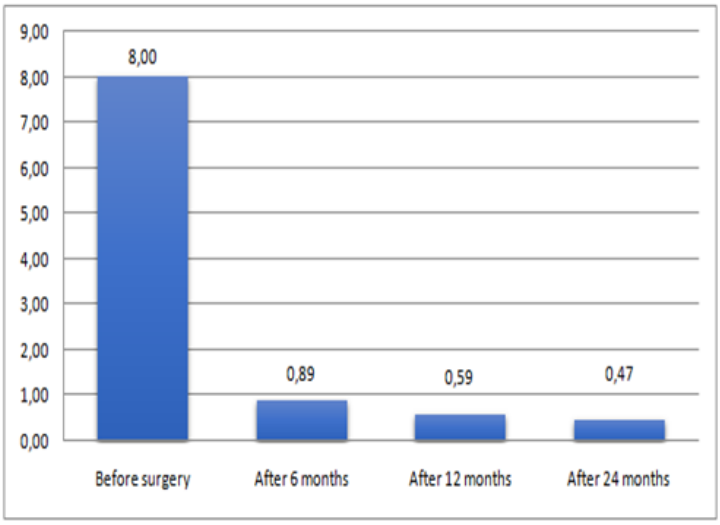
The ratio of spontaneous pregnancy increased from the 6-month to the 12-month follow-up after surgery (chi- squared 15.94, p<0.001) and from the 12-month to 24-month follow-up after surgery (chi-square 9.07, p<o.o28), while it increased significantly from the 6-month to the 24-month follow-up after surgery (chi-squared 41.34, p<0.001).

Figure 3: Comparison of EHP-36 scores before and after surgery according to timing of the follow-up (6, 12 and 24 months).

Symptoms	**Frequency**	**Percentage**	**Frequency**	**Percentage**	**Total**
		Yes		**No**	**Total**
Rectal bleeding	18	21%	69	79%	100%
Painful defecation	25	29%	62	71%	100%
Urinary problems	43	49%	44	51%	100%
Pressing pain or discomfort	50	57%	37	43%	100%
Stabbing pain or discomfort	57	66%	30	34%	100%
Tender pain or discomfort	59	68%	28	32%	100%
Crushing pain or discomfort	66	76%	21	24%	100%
Gastrointestinal discomfort	70	80%	17	20%	100%
Pricking pain or discomfort	72	83%	15	17%	100%

The incidences of problems/pains significantly differ from each other. The most frequent is pricking pain or discomfort, while the least frequent is rectal bleeding.

Table 3: Frequently experienced preoperative pain and other symptoms associated with endometriosis in this study (n=87).



Multivariate Tests	Value	F	Hypothesis df	Error df	Sig.
Pillai's Trace	0.653	36.348	3	58	<0.001
Wilks' Lambda	0.347	36.348	3	58	<0.001
Hotelling's Trace	1.88	36.348	3	58	<0.001
Roy's Largest Root	1.88	36.348	3	58	<0.001

As the mauchly variance homogeneity test proves heteroscedasticity (chi-squared (5)=128.943, p<0.001). MANOVA for testing the differences among the QoL change during time, prove significant increase in QoL after the surgery. This improvement was experienced mostly after 12 months postsurgery.

Figure 4: Comparison of EHP-36 scores before and after surgery according to timing of the follow-up (6-12-24 months).

Women's emotional, socioeconomic and physical state personal assessment before surgery									
Assessment	**Very bad (0-20%)**		**Bad (20-50%)**		**Satisfactory (60-70%)**		**Good (80-100%)**		**Mean/Std**
Characteris-tics	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**	
Quality of life	47	54.0%	31	35.6%	8	9.2%	1	1.1%	1.5 ± 0.71
General wellbeing	48	55.2%	33	37.9%	6	6.9%	NA	NA	1.5 ± 0.63
Sexual prob-lems (dyspa-reunia)	34	39.1%	22	25.3%	19	21.8%	12	13.8%	2.1 ± 1.18
Urinary problems	5	5.7%	25	28.7%	12	13.8%	45	51.7%	3.5 ± 1.42
All painful complaints	53	60.9%	34	39.1%	NA	NA	NA	NA	1.4 ± 0.49

ass-ociated with endometriosis									
Dyschezia	8	9.2%	30	34.5%	19	21.8%	30	34.5%	3.0 ± 1.30
Women's emotional, socioeconomic and physical state personal assessment after 24-month follow-up post-surgery									
	No improvement /relapse/(0–20%)		**Little improvem-ent (20-50%)**		**Moderate impro-vement (60-70%)**		**Significant/comp lete improvement (80–100%)**		**Mean/Std**
Characteristi cs	**Freque ncy (n)**	**Percent (%)**	**Freque ncy (n)**	**Percent (%)**	**Freque ncy (n)**	**Percen t (%)**	**Freque ncy (n)**	**Percen t (%)**	
Quality of life	5	5.7%	1	1.1%	2	2.3%	79	90.8%	9.2 ± 2.34
General wellbeing	1	1.1%	4	4.5%	19	21.8%	63	72.4%	4.9 ± 1.03
Sexual problems (dyspareunia)	2	2.2%	6	6.8%	4	4.6%	75	86.2%	3.0 ± 4.65
Urinary problems	NA	NA	1	1.1%	6	6.9%	80	92.0%	5.4 ± 5.43
All painful complaints associated with endometriosis	2	2.2%	5	5.7%	9	10.3%	71	81.6%	6.0 ± 1.66
Dyschezia	NA	NA	2	2.2%	8	9.1%	77	88.5%	3.7 ± 5.07

Table 4: Improvement in quality of life and general wellbeing before and after surgery in women with endometriosis (n=87).

4. Discussion

The good physical and mental states of the populace is a necessity for a healthy state. Women occupy a special role in the nation and the building of families and societies. Therefore, what affects them exhibits a significant influence on the system (society). In this study, we hoped to established the psychoemotional, physical and economic trauma inflicted by endometriosis on women and the possible benefit of endoscopic surgery. This study demonstrates some of the usefulness of the EHP-36, VAS, and another questionnaire in evaluating the QoL and wellbeing in patients with endometriosis after radical laparoscopic surgery.

Many studies have shown that endometriosis-related symptoms and complaints are associated with numerous

handicaps on women in terms of learning abilities, infertility, reduced QoL, and loss of work productivity [21, 22]. Comparable to our study, other studies also reported the serious negative effects of endometriosis on the learning abilities of individuals [23, 24].

Likewise, just like many other previous related studies, mainly in the Western and the developed world, we encountered some challenges. This series of limitations were also confronted in those studies due to sample size, difficulty in choosing a control group (as the diagnosis is mainly surgical), delay in diagnosis, multiplicity of symptoms etc. [25, 26]. Other factors affecting the quantification of the impact of endometriosis on women and society are lack of geographical spread, educational standards within a given society, and ethnocultural differences across different countries [12, 25]. The average age of first symptoms in this study was 24.5 ± 5.710 years (15–37), which is similar to other studies reported, with an average age of first symptoms between 20 and 29 years [26-27]. In our study, the average age of diagnosis is 34.2 ± 5.97 years (20-48). In our study, we observed an average diagnostic delay of 9.7 ± 0.35 years, which is inconsistent with earlier reports from the UK and US. [28, 29]. The reasons for a delay may be numerous, including sociocultural behaviour, lack of personnel, health care cost, others strongly associated with care-seeking experiences in primary care, discrediting nature of menstruation, and risk of stigmatization [30-31]. In our study, the unbearable chronic pain, frequency of pain, fatigue and psychological symptoms (such as self-reported depression and anxiety) were significantly high, which we were able to analyse using the modified EHP-36 to compare the postsurgical state of the patient. The overall post-surgical follow-up outcome showed significant improvements in all areas of the contest, as illustrated in Tables 2, 3, 4 and in Figures 1, 2 and 3 (all $p < 0.001$).

The effect of endometriosis on physical wellbeing, excluding the mental distress of women, also significantly improved after surgery, using the VAS and the NRS-11 pain scores (QoL), which gradually decreased from 8.0 ± 2.11 points before surgery to 0.47 ± 1.25 points after surgery). This was an improvement over the study conducted by Alborzi et al. in 2017, where the outcome was 8.23 ± 2.03 points, which decreased to 4.46 ± 2.47 points in 93.0% of patients [25]. Using the modified EHP-36, the effect on socioemotional wellbeing was also substantively significant ($p < 0.001$), as illustrated in Table 2 and Figure1, which was relatively similar to some other earlier studies [32-34]. These derogatory and agonizing states around these women, due to the physical, emotional, and socioeconomic effects of endometriosis, were significantly reduced or completely eradicated with the effect of radical surgery, as close to 93.1% of patients reported substantial to complete improvement in their QoL, while 94.2% of patients reported significant to complete improvement in their general wellbeing 24 months after surgery in Table 4. Other studies also recorded some level of postsurgical success; however, their outcomes were not superior [25, 35]. Pain-related symptoms of endometriosis were attributed to be the major factors of learning dysfunction and work productivity loss in endometriosis, as in other studies conducted by Nnoaham et al. [12] and Bahrami et al. [36].

However, less emphasis was made in assessing reduced effectiveness at work rather than work absence, unfortunately, which accounts for close to 60% of total work productivity loss. The total indirect costs of productivity loss per patient per year were estimated at $9910.57, while the surgery cost per patient per year was

about $1415.08 [12, 37]. The annual estimated financial burden to individuals and society varied from US $1.6 billion in Hungary, US $9.9 billion in the UK, US $12.5 billion in Germany to the US $49.6 billion in the US, as reported by Simoens et al. in 2012 [37-38]. Another study conducted by Armours et al. [11], reported an estimated cost of about US $6.50 billion, of which the majority of costs (75–84%) were due to productivity loss. Unfortunately, in this study, emphasis was not made on general productivity loss or other expenses incurred by patients, as the aim of the study was mainly on the effectiveness of laparoscopy in the management of endometriosis and QoL. In 2013, Prast et al. also conducted a retrospective study about the economic burden of endometriosis, with a total direct cost per patient per year (public insurance and out-of-pocket) of $8819.64 and a total indirect cost per patient per year (sick leave and unemployment due to endometriosis) of $3314.39 [10].

Despite, the role of painful symptoms of endometriosis affecting work productivity loss, loss of valuable time in learning, and cost involved, as shown in this study and other earlier relevant studies [21-22, 37]. Other severe derogatory implications of endometriosis are also very frequent, such as is its impact on fertility [7, 12, 39]. In accordance to this study, many studies have also reported a negative impact on fertility and as a result the medical, health, and economic downturn/cost/due to subfertility/infertility associated with the disease [21, 40]. In this present study, subfertility/infertility affected about 61% of the women, seemingly in agreement with other previous studies [25, 41]. Interestingly, the post-surgical fertility outcome was encouraging, even though the follow-up period of 24 months was short.

Pregnancy was recorded in 52.5% (32/61) of women, with a live birth rate of 78.1% (25/32) and missed abortion/incomplete abortion rate of 12.5% (4/32); 9.4% (3/32) of patients were lost to follow-up during pregnancy ($p < 0.001$). We obtained a better outcome than other similar studies, such as that conducted by Soriano et al. in 2016, where they reported successful deliveries in 33 women (42.3%). Three women (9%) conceived spontaneously, and all the other women conceived after IVF treatment. Women who delivered were younger (32.5 ± 4.1 years vs. 35.5 ±3.8 years), while in 2018, Roman et al. conducted a study with the following outcomes at the end of a follow-up period of 79 months: 29 patients achieved pregnancy (81%), with natural conception being recorded in 17 of them (59% of conceptions and 29 deliveries (78%)) [42-44].

Both general patient wellbeing and QoL improved significantly, with patient's preoperative perceptions of QoL and GWB being rated from bad to very bad 89.6% and 93.1%, respectively, while patient's postoperative perceptions significantly improved by 93.1% and 94.2%, respectively ($p < 0.001$). The improvement observed was mainly the result of experiencing disease-free states and the return of fertility in most cases. This outcome was in line with studies conducted by Alborzi et al. [25], Nnoaham et al. [12] and Marjaleena et al. [34]. A slight correlation was observed in the family linkage (genetics) of about 15% [46] of patients. Endometrioid carcinoma was recorded in a 45-year-old patient (1/87; 1.6%), which was similar to other studies [47]. In this study, we did not find any significant association between cigarette smoking, alcohol consumption and endometriosis, which was similar to a study conducted by Bravi et al. [48] and Thylan [49], respectively. Similarly, an association between eating habits, types of food and endometriosis was not ascertained. However, there was a tendency shift in prevalence in those who consumed more pure alcohols and cigarettes, which may be the result of the negative impact of endometriosis,

triggering a soul comforting lifestyle [48]. There was no direct influence of other medical conditions, although a higher occurrence was observed in those with thyroid diseases and previous use or no use of contraceptive, antihypertensive, and antidiabetic drugs.

Additional surgical procedures were warranted due to the spread of the disease, such as the Dixon operation (2/87; 2.3%) due to intestinal involvement. Bladder resection was done in 9.2% (8/87) of patients, and adhesiolysis was performed in 70.1% (61/87) of patients, as adhesions are one of the major direct complications of endometriosis and the most frequently affected organ was the left ovary (37/87; 42%), which was similar to other studies [13, 18, 25]. A study conducted by Kamalifard et al. reported that women who used cloth menstrual pads had a higher incidence of endometriosis; this outcome is similar to the unexpected outcome of our studies where more women reported the regular use of sanitary napkins (pads) (63/87; 72%) [50]. The possible mechanism of action may be slowing down the menstrual flow, thereby possibly aiding retrograde menstruation.

However, some of this result could be presumed, as there are not enough adequate scientific proofs, and therefore may warrant broader and more thorough investigations. Also, the incorporation of the additional modifications into the EHP-36 questionnaire adopted in this study also highlighted some issues to focus on when attending to patients in the outpatient units, indicating the possible presence of endometriosis. Such issues include heavy bleeding in 66% (57/87) of patients, irregular bleeding (including mid-cycle spotting) in 49% (43/87) of patients, lower abdominal pain not associated with current infectious disease relieved only by NSAIDs in 73.6% (64/87) of patients and difficulty to conceive in 66.6% (58/87) of patients in this study, which is similar to other studies [12, 13, 25, 40].

5. Conclusions

Women with endometriosis are under a severe agonizing state of mind, and their general wellbeing and QoL are significantly impaired. Individualized radical laparoscopic surgery, with an occasional combination of hysteroscopic manoeuvres, significantly improves wellbeing, QoL, sexual function, and return of fertility, regardless of stage and age of the patient, and this can be quantified and qualified. The incorporation of the EHP-36 questionnaire improves service by providers and leads to a wider scope of accessing gynaecologic patients in outpatient clinics, with an early suspicion of endometriosis as the background disease behind the patient's symptoms.

Author Contributions

For research articles with several authors, a short paragraph specifying their individual contributions must be provided. The following statements should be used "Conceptualization, A.A.E. and M.K.; methodology, IF., A.A.E.; software, A.A.E.; validation, A.A.E., M. K. and I.F.; formal analysis, A.A.E.; investigation, A.A.E; resources, Á.R.; data curation, P.S.; writing—original draft preparation, Á.K.; writing—review and editing, A.A.E.; visualization, M.K.; supervision, M.K., P.S.; project administration, Á.K.; funding acquisition, A.A.E. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest

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