Health-related quality of life after pelvic organ prolapse surgery in Ethiopia: A 6 month follow-up study

Tadesse Belayneh (✉ tadbel20@gmail.com)  
University of Gondar College of Medicine and Health Sciences  https://orcid.org/0000-0003-2578-4203

Abebaw Gebeyehu  
University of Gondar College of Medicine and Health Sciences

Mulat Adefris  
University of Gondar College of Medicine and Health Sciences

Guri Rortveit  
Universite of Bergen

Janne Lillelid Gjerde  
Haukeland Universitetssjukehus

Tadesse Awoke  
University of Gondar College of Medicine and Health Sciences

Research article

Keywords: Quality of life, Uterine prolapse, Utero-vaginal prolapse, Vaginal surgery

DOI: https://doi.org/10.21203/rs.3.rs-30009/v1

License: ☺️ ☀️ This work is licensed under a Creative Commons Attribution 4.0 International License.  
Read Full License
Abstract

Background

Pelvic organ prolapse (POP) affects health-related quality of life (HRQoL). Patient-reported outcomes (PRO) measures the quality of care from the patient’s perspective. PROs are an important measure of surgical outcome and used to calculate health gains after surgical treatment. We assessed HRQoL in women undergoing surgical repair of POP.

Methods

Two hundred fifteen women with stage III or IV prolapse underwent surgical POP repair between February 2018 and May 2019. Pelvic Organ Prolapse Quality of Life (P-QoL-20) was administered at baseline, 3 and 6 months postoperatively to assess HRQoL. Depressive symptoms and body image also evaluated. Linear mixed-effect models were used to compare pre and postoperative HRQoL scores and investigate potential predictors.

Results

Participant’s mean age was 49.3 ± 9.4 years. Most (81.9%) had stage III prolapse and underwent a vaginal hysterectomy, although 40% preferred uterine preservation. No differences were seen between women follow-up and those lost to follow-up in HRQoL ($p > 0.05$). The P-QoL, depressive symptoms, and body image were improved 6 months post-operatively. The change in P-QoL significantly associated with body image scores. The type of surgery did not show a significant difference. Being married showed an improvement in the personal relationship subscale score ($\beta = 5.8$, $p < 0.01$).

Conclusions

Our results indicated a potential improvement of HRQoL after surgical treatment. The result could be useful for patient counseling on the expected HRQoL outcomes of surgical treatment. Surgical service should be accessible for women suffering from POP to improve HRQoL.

Background

Pelvic organ prolapse (POP) is a common problem affecting health-related quality of life (HRQoL) [1, 2]. It is one of the most prevalent gynecological conditions requiring surgical treatment with a lifetime risk of 11–19% based on data from High Income Countries (HIC) [3, 4]. The surgical repair of POP seems to improve HRQoL [5], however, it is not always possible because of anatomic failure, recurrence of symptoms or postoperative complications [6, 7]. Vaginal hysterectomy, for instance, has been found to be inadequate for restoring pelvic support [8]. A recent review also reported subjective and objective
recurrence rates of 7–14% and 23–41%, respectively [9]. Furthermore, there are significant cost implications for POP surgery after failure of the first surgery [5, 10].

The definition of surgical success following POP repair is debatable between patient and surgeon [11, 12]. In studies of POP surgery, objective and satisfaction outcomes, and HRQoL are recommended to be reported [13]. However, most studies have focused on anatomical success without considering subjective outcomes [5]. The contemporary definition includes not only the anatomical success but also patient-reported outcome measures (PROMs) [13].

In most low and middle-income countries (LMICs) surgery is expensive, facing catastrophic expenditure paying for surgical care [14]. Because of the high cost to patients, it is imperative that surgical care is of high quality and has a meaningful impact on patients. But little evidence of PRO use in LMICs including Ethiopia [15]. In Ethiopia, unlike obstetric fistula, there is no free surgical service to POP. Yet, the Ethiopian Ministry of Health in collaboration with the United Nations Population Fund and Women and Health Alliance International regularly organizes the “POP surgical campaign” in governmental hospitals to treat symptomatic women [16]. A recent study in Ethiopia reported 46% symptomatic POP requiring treatment [17].

The HRQoL is a multi-dimensional concept that evaluates the perceptions of the impact of disease or treatment on physical, psychological, and social function [18]. It has been used as a primary outcome measure to evaluate the effectiveness of POP treatments [19]. The primary goal of POP surgery is to provide quality care with meaningful patient impact, i.e. reduce symptoms and improve HRQoL [12]. However, in HIC, outcomes of studies on HRQoL are inconsistent [20, 21] and mostly focused on anatomical outcomes [5]. In LMICs including Ethiopia, PRO outcomes after POP surgery were infrequently reported. Recent qualitative findings from Ethiopia reported that rural women receiving free-of cost POP surgery experienced great benefit in many aspects of their life [22]. Although the outcomes of surgery on HRQoL is hardly comparable between women living in high versus low income contexts, more evidence on the effect of POP surgery are needed specifically in low-income contexts. Therefore, this study aimed to assess HRQoL before and after POP surgery via the use of PRO tool, the Prolapse Quality of Life.

**Methods**

A single-group longitudinal study (pre-post) was conducted on women admitted at the University of Gondar referral hospital (UoGH) for prolapse repair from February 2018 to May 2019. The study time period ended in November 2019 with the 6 months follow-up of the last study subjects. Women were eligible for inclusion if they had symptomatic stage III or IV prolapse according to the Pelvic Organ Prolapse Quantitation (POP-Q) classification system [23] and desired surgical correction. Women who had surgery performed by an abdominal approach, with current co-morbidities, or who had previously undergone POP surgery were excluded.

**Surgical Procedures**
The surgical treatment consisted of the correction of all the defects. The decisions as to which technique to use and which defects to treat were left to the discretion of the operating surgeon. Cystocele and rectocele were treated with conventional anterior and posterior colporrhaphy. For uterine descent, either vaginal hysterectomy (VH) or uterine-preserving procedures (UPP, such as sacrospinous fixation) were performed. All procedures were performed under spinal anesthesia. During discharge, patients were informed to avoid sexual intercourse and heavy lifting/work load for approximately 3 months and asked to have a follow-up visit at 3 and 6 months.

Sample Size Calculation

Assuming a paired difference of 3, the standard deviation of the differences $15 \pm 24$, considering $\alpha = 0.05$, power of 80% and a possible loss of 15% during the follow-up, sample size became 224.

Study Instruments

The following instruments were used to investigate PROs: Prolapse Quality of Life (P-QoL), POP Symptom Score (POP-SS), Body Image in POP (BIPOP) and Patient Health Questionnaire (PHQ-9) to evaluate HRQoL, presence and/or severity of POP symptoms, body image perception, and depressive symptoms, respectively.

The P-QoL included 20-items divided into nine domains: General Health Perception (GHP), Prolapse Impact (PI), Role Limitation (RL), Physical Limitation (PL), Social Limitation (SL), Personal Relationship (PR), Emotion (EMO), Sleep/Energy (SE), and Severity Measures (SM). Questions ranked on a 4 Likert scale, with a higher score indicating poor HRQoL [25]. The Amharic version had three components: physical (PC; including GHP, PI, PL, RL SL, and SM), psychological (PSC; including EMO and SE), and social/personal relationship component (PRC; containing PR). The Amharic version is easy to use, can be administered face-to-face and is publicly available [26]. This study measured QoL using domains for PC, PSC, and PRC of the P-QoL instrument.

The POP-SS comprises 7-items and scored from 0–28, with higher scores are indicative of more bothersome symptoms [27]. The POP-SS used in the present study was validated in the Amharic language, and details found elsewhere [28].

The PHQ contains 9-items, with higher scores indicating more severe depressive symptoms [29]. It has been validated for use in primary care and obstetrics/gynecology outpatient clinics to diagnose major depressive disorders [30]. The current study utilized the Amharic version [31].

The BIPOP includes 10-items regarding the possible impact of POP on a woman's perception of her body including genital body image, sense of attractiveness and risk for sexual dysfunction [32]. Each item uses a 5-point Likert response with lower scores indicating better body image [33]. The English version was translated into Amharic and back to English to confirm the correctness.
Data Collection Methods

Data were collected preoperatively, 3 and 6 months postoperatively by trained female nurses. All baseline interviews were administered face-to-face at UoGH and subsequent interviews were conducted either at participant’s home, nearby clinics or UoGH. Preoperatively socio-demographic data including age (years), residence (urban or rural) marital status (partner or not), employment status, and educational level (literate or not) were collected.

Data such as the stage of POP, duration of POP symptoms (years) and type of operation (VH or UPP) were also abstracted from patient medical records using a standardized form. Furthermore, women were asked to complete all the PROs including P-QoL, PHQ-9, BIPOP, and POP-SS. These same PRO instruments were administered postoperatively. Duration of POP symptoms denotes the number of years from the time when prolapse symptoms (feeling/seeing of vaginal bulging) first occurred and then classified as delayed to seek healthcare if she stayed more than a year [34].

Statistical Analyses

Each completed instrument was checked visually for completeness before fed to a computer. Data were summarized using mean with standard deviation (SD) or median with interquartile ranges (IQRs) for continuous, and numbers with percentages for categorical variables.

The primary outcome was change in P-QoL scores (9 domains, PC, PSC, and PRC). Linear mixed effect models were used to assess the change in QoL. Furthermore, linear mixed-effect model was used to investigate the potential predictors. First, P-QoL outcome measurements (PC, PSC and PRC subscales) over time were compared using a random intercept model assuming time as a fixed effect. Then, the models were fitted with PC, PSC and PRC scores as dependent variables, and time, age, type of surgery, POP duration, marital status, POP-SS, PHQ, and BIPOP scores as a covariate (fixed effect). For each model, we reported the fixed effects coefficients ($\beta$ value) of the independent variable with the associated 95% CI and $P$-value. A model with random intercepts and slopes and having an unstructured covariance structure was employed after model comparison with the Akaike information criterion (AIC). The unstructured covariance structure, which accounts for the within-subject correlation, was chosen based on the model fit using AIC. For all analyses, $p < 0.05$ was considered statistically significant and normality was assessed using Shapiro-Wilk test. Statistical analyses were performed using STATA, version 14.0. A lower mean P-QoL scores, indicating improvement, were expected postoperatively.

Ethical approval

The study protocol was approved by the University of Gondar Institutional Health Research Ethics Review Committee (UoG (O/V/P/RCS/05/216/2017). Written informed consent was obtained from all individual participants included in the study.
Results

Response rate

Of the 226 subjects enrolled, 215 (97.7%) took part in the baseline interview. Eleven patients revoked their consent before the operation. At 3 months postoperatively, data was recorded for 193 (89.7%) subjects. At the 6 months follow-up, 185 (86.0%) were assessed, leaving 30 patients dropped out. The primary reasons for leaving the follow-up schedule included declined further participation (n = 8), lost to follow-up for unknown reasons (n = 8), relocation (n = 10), died for reasons unconnected to the study (n = 2), or incomplete data (n = 2).

Socio-demographic characteristics

Mean patient age at the time of surgery was 49.3 ± 9.4 years (35 – 70 years). Mean number of children born to the patients was 5.9 ± 2.6 children. One-fifth had under-five children. The majority patients had stage III prolapse (81.9%), and more than half underwent a vaginal hysterectomy. However, almost two-fifth of them would prefer uterine preservation preoperatively, provided that outcomes were equal (Table 1).
Table 1
Participants baseline characteristics at University of Gondar referral Hospital, 2019 (N = 215).

| Characteristic                        | Data value |
|---------------------------------------|------------|
| Age (years), Mean (SD)                | 49.3 (9.4) |
| Pregnancy, Mean (SD)                  | 6.5 ± 2.5  |
| Parity, Mean (SD)                     | 5.9 (2.6)  |
| Marital status                        |            |
| Married/cohabiting                    | 188 (87.4) |
| Not married*                          | 27 (12.6)  |
| Educational status                    |            |
| Illiterate                            | 204 (94.9) |
| Literate                              | 11 (5.1)   |
| Occupational status                   |            |
| Farmer                                | 94 (43.7)  |
| Housewife                             | 84 (39.1)  |
| Other**                               | 37 (17.2)  |
| Child < 5 years                       |            |
| Yes                                   | 47 (21.9)  |
| No                                    | 168 (78.1) |
| Duration of POP                       |            |
| ≤ 1 year                              | 59 (27.4)  |
| ≥ 2 year                              | 156 (72.6) |
| POP stage                             |            |
| Stage III                             | 176 (81.9) |
| Stage IV                              | 39 (18.1)  |
| Prefer uterine preservation if,       |            |
| Preservation > Hysterectomy           | 82 (38.1)  |

Data are shown as number with percentage unless stated

* Not married: single or divorced or widowed.

** Other: student, merchant and jobless.
A large number had had POP for a long time before seeking treatment (median = 5.2; range 1–26 years). Reasons reported as the main barriers to seek early treatment were lack of money (21.2%), fear of disclosure (15.9%), the perception that POP is incurable (13.6%), fear of treatment outcome (12.1%), lack of accompanying support (8.6%), distance from a health facility (requiring 2 days or more to reach health facility) (6.2%), and lack of transportation (5.0%). However, 59.5% had decision making power to visit health care when getting sick (data not shown).

**Quality of life, body image and depressive symptoms**

A significant improvement in the score of PRO instruments (P-QoL, POP-SS, BIPOP, and PHQ) were recorded over the course of the study \( p < 0.001 \), **Fig. 1, Table 2**. There was variability in the score at baseline, and 3 and 6 months postoperatively (Fig. 2).
Table 2
Change of prolapse related quality of life as measured with PRO instrument during the 6 months follow-up period at UoGH, 2019.

| P-QoL domains | Preoperatively<sup>a</sup> | At 3 months | At 6 months | P-value |
|---------------|---------------------------|-------------|-------------|---------|
|               | Mean ± SD                 | Mean ± SD   | Mean ± SD   |         |
| P-QoL domains |                           |             |             |         |
| GHP           | 60.5 ± 20.1               | 39.2 ± 16.4 | 21.8 ± 13.3 | < 0.001 |
| PI            | 69.1 ± 25.6               | 32.8 ± 19.1 | 26.1 ± 22.7 | < 0.001 |
| RL            | 74.5 ± 19.5               | 29.0 ± 20.6 | 17.0 ± 13.4 | < 0.001 |
| PL            | 75.5 ± 19.1               | 26.1 ± 16.9 | 15.2 ± 13.9 | < 0.001 |
| SL            | 66.1 ± 15.9               | 21.8 ± 16.5 | 12.2 ± 10.3 | < 0.001 |
| PR            | 76.7 ± 14.1               | 15.0 ± 12.6 | 20.0 ± 18.2 | < 0.001 |
| EMO           | 64.4 ± 27.5               | 28.9 ± 19.3 | 14.4 ± 12.6 | < 0.001 |
| SE            | 46.7 ± 26.0               | 28.6 ± 19.6 | 16.3 ± 12.7 | < 0.001 |
| SM            | 46.2 ± 26.5               | 14.5 ± 12.4 | 8.5 ± 6.6   | < 0.001 |
| P-QoL components |                        |             |             |         |
| PC            | 65.3 ± 14.0               | 26.6 ± 12.5 | 16.2 ± 7.8  | < 0.001 |
| PSC           | 55.5 ± 23.5               | 28.8 ± 18.7 | 15.3 ± 10.1 | < 0.001 |
| PRC           | 76.7 ± 14.1               | 15.0 ± 12.6 | 20.0 ± 18.3 | < 0.001 |
| Body image    |                           |             |             |         |
| BIPOP         | 33.9 ± 7.3                | 21.1 ± 5.4  | 17.4 ± 5.6  | < 0.001 |
| POP symptoms  |                           |             |             |         |
| POP-SS        | 16.6 ± 4.3                | 5.2 ± 1.8   | 2.1 ± 1.2   | < 0.001 |
| Depressive symptoms |                    |             |             |         |

<sup>a</sup> Baseline scores as reference.

P-value is calculated using linear mixed effect model unless specified.

* Wilcoxon signed-rank test.

The higher the recorded score of P-QoL, POP-SS and BIPOP, the lower the QoL, severity of POP symptoms and body image perception. Mean values and standard deviation (SD) were calculated for the preoperative period, and at 3 and 6 months after surgery.
Before surgery, patients had the worst scores regarding personal relationships (76.7 ± 14.1), physical limitations (75.5 ± 19.1), role limitations (74.5 ± 19.5), and prolapse impact (69.1 ± 25.6). The strongest negative effect on patients in terms of the social limitations (66.1 ± 15.9), and the impact on emotions (64.4 ± 27.5) was also experienced preoperatively. A significant improvement was recorded after 6 months for the above listed domains as well as for other investigated domains. All domains of P-QoL improved significantly after 6 months of surgery compared to their status prior to operation (Fig. 1 and Table 2). This positive effect on QoL remained stable in patients surveyed at 3 and 6 months. However, this improvement did not reproduce in personal relationships domain score during this follow-up period, and patient had worse score (15.0 ± 12.6 to 20.0 ± 18.3, p = 0.005, paired t-test). Quality of life was significantly higher as measured by PC, PSC and PRC scores at 6 months (p < .001, Fig. 2 and Table 2).

Patients’ prolapse related symptom scores dropped gradually from the baseline to the 6 months in the longitudinal analysis. POP-SS score significantly dropped from 16.6 ± 4.3 to 2.1 ± 1.2. Likewise, patients’ depressive symptom scores dropped from the baseline (16.4 ± 6.5) to the 6 months (7.8 ± 4.3) after surgery. Furthermore, we observed an improvement in BIPOP score over time, indicating a better body image perception after surgery. The BIPOP score reduced from 33.9 ± 7.3 to 17.4 ± 5.6 (p < 0.001, Fig. 2 and Table 2).

**Predictors of quality of life**

LMM analysis was performed to examine the longitudinal effects of sociodemographic, POP-SS, BIPOP and PHQ on P-QoL domains/components (Table 3). The change in P-QoL after surgery was associated with the change in POP-SS, PHQ and BIPOP scores (p < 0.001). There was a change on PC and PRC score overtime for a point change in the POP-SS, PHQ and BIPOP scores. Each improvement in the POP-SS score resulted in an approximately 7 and 13 point improvement in the PC and PRC scores, respectively (p < 0.001). Being married resulted in a 5.7 point increase in the PRC score (p < 0.01) (Table 3).
Table 3
Predictors of P-QoL using linear mixed effect models, UoGH, 2019.

| Parameter                  | Estimate | SE   | P-value | 95% confidence intervals | Lower bound | Upper bound |
|----------------------------|----------|------|---------|---------------------------|-------------|-------------|
|                            |          |      |         |                           |             |             |
| Results for physical (PC)  |          |      |         |                           |             |             |
| component of P-QoL         |          |      |         |                           |             |             |
| Interceptor               | −66.62   | 17.34| < 0.001 | −100.63                   | −32.62      |             |
| Marital status            | 2.55     | 1.58 | 0.10    | −0.55                     | 5.65        |             |
| POP-SS                    | 6.95     | 1.36 | < 0.001 | 4.28                      | 9.62        |             |
| PHQ                       | 4.70     | 1.20 | < 0.001 | 2.33                      | 7.07        |             |
| BIPOP                     | 3.89     | 0.60 | < 0.001 | 2.70                      | 5.08        |             |
| Time                      | 23.06    | 5.28 | < 0.001 | 12.70                     | 33.41       |             |
| Results for psychological (PSC) component of P-QoL |          |      |         |                           |             |             |
| Interceptor               | −50.35   | 26.89| 0.06    | −103.07                   | 2.36        |             |
| Marital status            | 2.56     | 2.32 | 0.27    | −1.99                     | 7.13        |             |
| POP-SS                    | 5.54     | 2.11 | < 0.01  | 1.39                      | 9.68        |             |
| PHQ                       | 4.42     | 1.86 | 0.01    | 0.77                      | 8.07        |             |
| BIPOP                     | 3.51     | 0.93 | < 0.001 | 1.69                      | 5.34        |             |
| Time                      | 14.55    | 8.06 | 0.07    | −1.28                     | 30.34       |             |
| Results for personnel (PRC) component of P-QoL |          |      |         |                           |             |             |
| Interceptor               | −159.38  | 22.09| < 0.001 | −202.69                   | −116.07     |             |
| Marital status            | 5.80     | 1.97 | < 0.01  | 1.93                      | 9.66        |             |
| POP-SS                    | 12.94    | 1.70 | < 0.001 | 9.60                      | 16.28       |             |
| PHQ                       | 5.95     | 1.53 | < 0.01  | 2.94                      | 8.96        |             |
| BIPOP                     | 5.69     | 0.76 | < 0.001 | 4.18                      | 7.19        |             |
| Time                      | 60.70    | 6.83 | < 0.001 | 47.29                     | 74.10       |             |

SE: standard error
Table 4
Comparison of baseline socio-demographic and HRQoL scores between those who completed the follow-up and those who had lost to follow-up at UoGH, 2019.

| Characteristics                  | Follow-up ($n = 185$) | Lost to follow-up ($n = 30$) | P-value$^\$ |
|----------------------------------|-----------------------|-----------------------------|--------------|
| Age, years (mean ± SD)           | 49.2 ± 9.2            | 49.8 ± 10.7                 | 0.77         |
| Pregnancies (mean ± SD)          | 6.6 ± 2.5             | 6.1 ± 2.7                   | 0.39         |
| Parity (mean ± SD)               | 5.9 ± 2.5             | 5.8 ± 2.8                   | 0.80         |
| Marital status, n (%)            |                       |                             | 0.08         |
| Married/cohabiting               | 158 (85.4)            | 18 (100.0)                  |              |
| Not married*                     | 27 (14.6)             | 0 (0)                       |              |
| Education status, n (%)          |                       |                             | 0.35         |
| Illiterate                       | 176 (95.1)            | 28 (93.3)                   |              |
| Literate                         | 9 (4.9)               | 2 (6.7)                     |              |
| POP stage, n (%)                 |                       |                             | 0.64         |
| Stage III                        | 151 (81.6)            | 25 (83.3)                   |              |
| Stage IV                         | 34 (18.4)             | 5 (16.7)                    |              |
| P-QoL domain scores              |                       |                             |              |
| PC (mean ± SD)                   | 65.5 ± 14.2           | 64.3 ± 12.9                 | 0.67         |
| PSC (mean ± SD)                  | 55.3 ± 23.7           | 56.9 ± 22.3                 | 0.71         |
| PRC (mean ± SD)                  | 76.4 ± 13.9           | 78.8 ± 15.1                 | 0.40         |
| POP-SS score (mean ± SD)         | 16.4 ± 4.2            | 17.9 ± 4.7                  | 0.06         |
| PHQ score (mean ± SD)            | 16.7 ± 6.3            | 14.5 ± 7.2                  | 0.09         |
| BIPOP score (mean ± SD)          | 34.2 ± 7.4            | 32.2 ± 6.6                  | 0.16         |

$^\$ Independent sample t-test.

* Not married: single or divorced or widowed.

Abbreviations: SD: standard deviation, PC: Physical component, PSC: psychological component, PRC: personal relationship component.
Age, parity, type of surgery and prolapse stage were not associated with improvement of QoL scores.

**Discussion**

In this study surgical repair of POP effectively improve POP symptoms, body image and HRQoL. This adds to the growing body of literature that POP and its surgical treatment is associated with HRQoL.

In order to ensure the quality of surgical outcome, reliable, valid and easy-to-use measures of surgical quality and patient impact are needed. The P-QoL is a PRO tool that can measure the impact of surgical interventions on women's HRQoL. This study uses P-QoL to demonstrate an improvement in patient-reported HRQoL after surgery in Ethiopia.

PRO tool assesses patient's opinion thereby measure a patient's health status or HRQoL. Usually PRO data are collected through short and self-completed questionnaires. But many are difficult to administer and may be difficult for populations with high illiteracy rates to understand [1]. However, P-QoL is simple and quick to use tool approximately taking 30 min to administer using face-to-face [26]. Our study adds to the evidence that P-QoL can be used as a PRO tool to demonstrate patient impact after surgery in LMIC, specifically Ethiopia.

The 86% follow-up rate observed in our study is much higher compared with Nepal's study that reported 64% [35].

Follow-up rates in LMICs are typically lower than those in high-income countries (HICs) although even follow-up rates vary considerably in HICs [36, 37]. In this study, the decline in further participation, lost to follow-up for unknown reasons and relocation were the reasons for leaving the follow-up schedule. To minimize the loss of patients to follow-up, a trained data collector periodically checked the data integrity and dealt with missing data by acquiring information from patients and family via repeated phone or in-person interviews. In addition, we also compared the baseline profiles of those who completed the study and those who dropped out. However, there was no difference in baseline socio-demographic, depressive and POP symptoms, body image and POP stage associated with P-QoL scores between the two groups ($p > 0.05$, Table 4).

In the current study surgical repair of POP showed a significant improvement of QoL for all 9 investigated domains of P-QoL instrument over the course of the study. Patients had a significantly lower impairment of their QoL at 3 months after surgery. At 6 months after the procedure, the QoL of the study participants had improved even more, and the difference to the preoperative figures remained significant. The better QoL scores compared to baseline scores were also observed in all the 3 P-QoL components (PC, PSC and PRC) after 6 months. Previous studies in Western countries using P-QoL instrument also confirmed that correction of POP via alloplastic vaginal meshes can significantly improve patients’ QoL [24, 38–42]. However, patients benefited from a highly significant improvement in all domains of QoL, although the surgery was native tissue repair in current study. Surgeries using the patient’s own tissues are the first-line operations in the treatment of POP [43]. Our finding also compare favorably with previous studies in
LMICs, although a different QoL tool used [35]. Furthermore, qualitative findings from Ethiopia reported that rural women receiving free-of-cost POP surgery experienced great benefit in many aspects of their life [22].

In our study, the average scores for prolapse effects on physical and role activities and personal relationships was quiet high at baseline. A previous study carried out in European women also showed similar scores for the same domains [24, 38, 39]. Daily life for Ethiopian rural women (e.g. the burden of physical activities/work, gender inequality affecting personal relationships, shame, lack of education/knowledge etc.) is hardly comparable to women living in Europe, and thus the higher baseline [22].

The remarkable improvement found in P-QoL domain scores (PC and PRC) after surgery could have a positive influence on formerly impaired HRQoL among those affected. This is similar to a study from Nepal [35], reporting a significant improvement in every aspect of the QoL measured. In rural settings where nearly all the housework was preformed by women alone or by help of their children and even women often help out on heavy farming activities [44, 45], the improvement of PC after surgery enabled them to perform daily household and/or outdoor roles like fetching water from distant, participating in farming activities and help in caring for under-five children.

Patients referred for surgery frequently complain about bulging and associated urinary, bowel or sexual symptoms, which are responsible for a significant decrease in HRQoL [46]. In the current study prolapse symptoms, especially vaginal bulging, and lower abdominal heaviness significantly improved postoperatively. Furthermore, the overall total score of POP-SS was significantly reduced after surgery. Similar results have been reported elsewhere [35, 36, 42]. This observation of improvement may be reassuring to the patient and clinician and may very well motivate more women suffering from POP to seek help.

The negative impact of POP on body image and sexual life has been well documented [47–49]. The current study demonstrated a significant improvement in body image 6 months after surgery. Similarly, another study found better body image and sexual satisfaction after surgical intervention [36, 50]. The patient may consider the altered genital anatomy due to the surgery to have a significant impact on their general sense of attractiveness. Moreover, the improvement of body image may be due to reduction of POP symptoms. Evidence showed strong association of POP symptoms and body image score [47–49]. In our study, worse body image score was reported preoperatively.

Despite 40% of women preferred uterine preserving procedures provided that outcomes were equal, more than half of them underwent a VH in this study. Although difference was not observed among groups in HRQoL scores, women's preference has to be considered for better surgical outcomes [51]. A more recent study in Ethiopia reported an abdominal approach with mesh augmentation as the most successful surgical repair for POP [52].
Prolapse symptoms are not life threatening but have significant negative effects on mental health of woman [15, 53]. Our study demonstrates that depressive symptoms improved significantly after surgical treatment. This finding is consistent with the results of previous studies showing significant improvement in the score of psychological and social health and QoL after surgical treatment [42, 54, 55]. Prolapse may increase symptoms of depression, while symptoms of depression may impact health behavior, symptom burden, QoL, and functional impairment pre- and post-operatively [56]. Our research found that surgery leads to a dramatic improvement not only in condition-specific QoL but also in depressive symptoms. Improved mental health status (PHQ and PSC score) could have positive effect on women's QoL after surgical intervention [15, 53].

Marital status had a significant association with the change in PRC domain score. Those who were married had greater improvement in HRQoL score than counterparts. This finding is supported by a qualitative study in Ethiopia, which reported that women who lived alone experienced poor improvement in their lives after surgery. For these women life continued to be a struggle [22]. They also found that avoidance of returning to heavy chores shortly after surgery depended substantially on the support from their family and community members, and proved difficult for those living alone [22]. This might be because the probability of getting social or relative support is better for those who live in marital bonds.

In the current study there was no difference in improvement in POP specific QoL following surgery by age group, parity, and stage of POP. Similar result on age group was also reported elsewhere [57].

**Strengths and limitations**

This study does have limitations. One is that with the 6 months follow-up period, our findings may only allow assessment of short to medium-term HRQoL outcomes. A long-term follow-up is needed to draw firm conclusions with regard to HRQoL and anatomical outcomes. Another limitation is that although our sample was women with POP, the study design was limited to single setting and lack of control group. Including women who had POP without intervention as a control group is unethical. Moreover, to evaluate the effect of surgery on HRQoL it would require a control group of similar patients without surgical repair. Since HRQoL among women post-surgery may not be comparable to women with an intact uterus, irrespective of their POP status, we did not include a comparison group to evaluate changes in HRQoL. Hence, our findings could theoretically be biased in directions that are difficult to predict and we cannot completely rule out the possible effect of changes occurring over time. The single setting warrants that the applied surgical technique was the same for every patient, and, therefore, the final outcome could be compared. A third limitation is that although we have no reason to doubt the truthfulness of the responses given form respondents, it is conceivable that patients may have withheld less socially desirable responses. The free surgical services received may also affect a patient's willingness to report a negative outcome. Furthermore, the patient survey based on questions about their QoL, body image, depressive symptoms are limited as the statements were obtained from the PRO instrument survey. The final limitation is losses to follow-up. Given that subjects who follow-up were not statistically different
from lost to follow-up, results did not substantially affect and may be generalizable to the entire surgical population in Dabat district. A significant bias may occur even with a small proportions of patients lost to follow-up [58], despite more than 20% poses serious threats to validity in general [59].

Despite the above limitations, our study has a number of strengths. This is one of the first studies to report on HRQoL among women underwent POP surgery in Ethiopia. Although POP is a complex and sensitive topic to study, the use of a disease-specific validated PRO tool, i.e. P-QoL, is an important strength. This enabled us to evaluate women’s POP symptoms, body image, and HRQoL in a local context. The use of these instruments further made the study findings internationally comparable. The follow-up rate of 84% is relatively high and the numbers are large compared to other follow up studies in LMICs.

Conclusions

In this study, we focus on patient-centered results in evaluating surgical outcome. Our study shows that there was a significant improvement in patient-reported HRQoL, body image, and depressive symptoms after surgical repair of POP in Ethiopian women. We recommend that P-QoL is used as a PRO tool by those involved in the delivery of surgical care to monitor the patient-centered impact of surgical interventions. Access to surgical services for disadvantaged women may also be important to improve HRQoL in women with POP.

Declarations

Conflict of interest.

All authors declare that they have no conflict of interest.

Availability of data and materials

The datasets used and/or analyzed during the current study available from the corresponding author on reasonable request.

Funding.

The study was supported by a grant from the University of Gondar, Ethiopia (no: O/VP/RCS/05/216/2017). The funding institution had no role in the study design, data collection, analysis, interpretation or writing up of the manuscript.

Author contributions
All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by Tadesse Belayneh, Abebaw Gebeyehu, Mulat Adefris, and Tadesse Awoke. The first draft of the manuscript was written by Tadesse Belayneh and all authors commented on the manuscript. All authors read and approved the final manuscript.

Acknowledgments.

We would like to thank women for participating in this study. We gratefully acknowledge all data collectors, supervisors and data clerks for their contribution. We would also acknowledge Women and Health Alliance International for covering the treatment cost of cases; and the staff of the Department of Obstetrics and Gynecology for treating the cases at the University of Gondar hospital.

Abbreviations

BIPOP
Body Image in Pelvic Organ Prolapse
HIC
High Income Countries
HRQoL
Health Related Quality of Life
LMICs
Low and Middle Income Countries
POP
Pelvic Organ Prolapse
POP-SS
Pelvic Organ Prolapse Symptom Score
POP-Q
Pelvic Organ Prolapse Quantification
PHQ
Patient Health Questionnaire
P-QoL
Prolapse Quality of Life
PROMs
Patient Reported Outcome Measures

References

1. Doae M, Moradi-Lakeh M, Nourmohammadi A, Razavi-Ratki SK, Nojomi M. Management of pelvic organ prolapse and quality of life: a systematic review and meta-analysis. Int Urogynecol J. 2014;25:153–63.
2. Laganà AS, La Rosa VL, Rapisarda AMC, Vitale SG. Pelvic organ prolapse: the impact on quality of life and psychological well-being. Journal of Psychosomatic Obstetrics Gynecology. 2018;39(2):164–6.

3. Smith FJ, Holman CAJ, Moorin RE, Tsokos N. Lifetime risk of undergoing surgery for pelvic organ prolapse. Obstetrics Gynecology. 2010;116(5):1096–100.

4. Løwenstein E, Ottesen B, Gimbel H. Incidence and lifetime risk of pelvic organ prolapse surgery in Denmark from 1977 to 2009. Int Urogynecol J. 2015;26(1):49–55.

5. Maher C, Feiner B, Baessler K, Schmid C. Surgical management of pelvic organ prolapse in women. The Cochrane database of systematic reviews 2013(4):CD004014.

6. Gotthart PT, Aigmueller T, Lang PF, Ralph G, Bjelic-Radisic V, Tamussino K. Reoperation for pelvic organ prolapse within 10 years of primary surgery for prolapse. Int Urogynecol J. 2012;23(9):1221–4.

7. Dällenbach P, Nancoz CJ, Eperon I, Dubuisson J-B, Boulvain M. Incidence and risk factors for reoperation of surgically treated pelvic organ prolapse. Int Urogynecol J. 2012;23(1):35–41.

8. Lee SH, Oh SR, Cho YJ, Han M, Park J-W, Kim SJ, Yun JH, Choe SY, Choi JS, Bae JW: Comparison of vaginal hysterectomy and laparoscopic hysterectomy: a systematic review and meta-analysis. BMC women's health 2019, 19(1):83.

9. Maher C, Feiner B, Baessler K, Christmann-Schmid C, Haya N, Brown J. Surgery for women with apical vaginal prolapse. Cochrane Database of Systematic Reviews 2016(10).

10. Diwadkar GB, Barber MD, Feiner B, Maher C, Jelovsek JE. Complication and reoperation rates after apical vaginal prolapse surgical repair: a systematic review. Obstetrics Gynecology. 2009;113(2):367–73.

11. Larsen MD, Lose G, Guldberg R, Gradel KO. Discrepancies between patient-reported outcome measures when assessing urinary incontinence or pelvic-prolapse surgery. Int Urogynecol J. 2016;27(4):537–43.

12. Barber MD, Brubaker L, Nygaard I, Wheeler TL. Defining success after surgery for pelvic organ prolapse. Obstetrics gynecology. 2009;114(3):600.

13. Toozs-Hobson P, Freeman R, Barber M, Maher C, Haylen B, Athanasiou S, Swift S, Whitmore K, Ghoniem G, De Ridder D. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for reporting outcomes of surgical procedures for pelvic organ prolapse. Neuourology Urodyn. 2012;31(4):415–21.

14. Shrime MG, Dare AJ, Alkire BC, O'Neill K, Meara JG. Catastrophic expenditure to pay for surgery worldwide: a modelling study. The Lancet Global Health. 2015;3:38–44.

15. Zeleke BM, Ayele TA, Woldetsadik MA, Bisetegn TA, Adane AA. Depression among women with obstetric fistula, and pelvic organ prolapse in northwest Ethiopia. BMC Psychiatry. 2013;13:236.

16. Gjerde JL, Rortveit G, Adefris M, Mekonnen H, Belayneh T, Blystad A. The lucky ones get cured: Health care seeking among women with pelvic organ prolapse in Amhara Region, Ethiopia. PloS one. 2018;13(11):e0207651.
17. Belayneh T, Gebeyehu A, Adefris M, Rortveit G, Awoke T. Pelvic organ prolapse in Northwest Ethiopia: a population-based study. International urogynecology journal 2019:1–9.

18. Fayers PM, Machin D: Quality of life: the assessment, analysis and reporting of patient-reported outcomes: John Wiley & Sons; 2015.

19. Al-Badr A. Quality of Life Questionnaires for the Assessment of Pelvic Organ Prolapse: Use in Clinical Practice. Lower urinary tract symptoms. 2013;5(3):121–8.

20. Barber MD, Maher C. Epidemiology and outcome assessment of pelvic organ prolapse. Int Urogynecol J. 2013;24(11):1783–90.

21. Durnea CM, Pergialiotis V, Duffy JM, Bergstrom L, Elfituri A, Doumouchtsis SK. A systematic review of outcome and outcome-measure reporting in randomised trials evaluating surgical interventions for anterior-compartment vaginal prolapse: a call to action to develop a core outcome set. Int Urogynecol J. 2018;29(12):1727–45.

22. Gjerde JL, Rortveit G, Adefris M, Belayneh T, Blystad A. Life after pelvic organ prolapse surgery: a qualitative study in Amhara region, Ethiopia. BMC Womens Health. 2018;18(1):74.

23. Manonai J, Mouritsen L, Palma P, Contreras-Ortiz O, Korte JE, Swift S. The inter-system association between the simplified pelvic organ prolapse quantification system (S-POP) and the standard pelvic organ prolapse quantification system (POPQ) in describing pelvic organ prolapse. Int Urogynecol J. 2011;22:347–52.

24. Fünfgeld C, Stehle M, Henne B, Kaufhold J, Watermann D, Grebe M, Mengel M. Quality of life, sexuality, anatomical results and side-effects of implantation of an alloplastic mesh for cystocele correction at follow-up after 36 months. Geburtshilfe Frauenheilkd. 2017;77(09):993–1001.

25. Digesu GA, Khullar V, Cardozo L, Robinson D, Salvatore S. P-QOL: a validated questionnaire to assess the symptoms and quality of life of women with urogenital prolapse. Int Urogynecol J. 2005;16:176–81.

26. Belayneh T, Gebeyehu A, Adefris M, Rortveit G, Genet T. Translation, transcultural adaptation, reliability and validation of the pelvic organ prolapse quality of life (P-QoL) in Amharic. Health Qual Life Outcomes. 2019;17(1):12.

27. Hagen S, Glazener C, Sinclair L, Stark D, Bugge C. Psychometric properties of the pelvic organ prolapse symptom score. BJOG: an international journal of obstetrics gynaecology. 2009;116:25–31.

28. Belayneh T, Gebeyehu A, Adefris M, Rortveit G, Genet T. Validation of the Amharic version of the Pelvic Organ Prolapse Symptom Score (POP-SS). Int Urogynecol J. 2019;30(1):149–56.

29. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. J Gen Intern Med. 2001;16(9):606–13.

30. Ghetti C, Lowder JL, Ellison R, Krohn MA, Moalli P. Depressive symptoms in women seeking surgery for pelvic organ prolapse. Int Urogynecol J. 2010;21(7):855–60.

31. Gelaye B, Williams MA, Lemma S, Deyessa N, Bahretibeb Y, Shibre T, Wondimagegn D, Lemenhe A, Fann JR, Vander Stoep A. Validity of the patient health questionnaire-9 for depression screening and diagnosis in East Africa. Psychiatry research. 2013;210(2):653–61.
32. Gray TG, Sneyd R, Scurr K, Jones GL, Iles D, Jha S, Radley SC. Patient-reported outcome measures which assess body image in urogynaecology patients: a systematic review. International urogynecology journal 2019:1–9.

33. Lowder JL, Ghetti C, Oliphant SS, Skoczylas LC, Swift S, Switzer GE. Body image in the pelvic organ prolapse questionnaire: Development and validation. American journal of obstetrics gynecology. 2014;211(2):174. e171-174. e179.

34. Adefris M, Abebe SM, Terefe K, Gelagay AA, Adigo A, Amare S, Lazaro D, Berhe A, Baye C. Reasons for delay in decision making and reaching health facility among obstetric fistula and pelvic organ prolapse patients in Gondar University hospital, Northwest Ethiopia. BMC Womens Health. 2017;17(1):64.

35. Dhital R, Otsuka K, Poudel KC, Yasuoka J, Dangal G, Jimba M. Improved quality of life after surgery for pelvic organ prolapse in Nepalese women. BMC Womens Health. 2013;13:22.

36. Ulrich D, Dwyer P, Rosamilia A, Lim Y, Lee J. The effect of vaginal pelvic organ prolapse surgery on sexual function. Neurourol Urodyn. 2015;34(4):316–21.

37. Fayers PM, Machin D: Quality of life: the assessment, analysis and interpretation of patient-reported outcomes: John Wiley & Sons; 2013.

38. Farthmann J, Mengel M, Henne B, Grebe M, Watermann D, Kaufhold J, Stehle M, Fuenfgeld C. Improvement of pelvic floor-related quality of life and sexual function after vaginal mesh implantation for cystocele: primary endpoint of a prospective multicentre trial. Archives of gynecology obstetrics. 2016;294(1):115–21.

39. Cadenbach-Blome T, Grebe M, Mengel M, Pauli F, Greser A, Fünfgeld C. Significant Improvement in Quality of Life, Positive Effect on Sexuality, Lasting Reconstructive Result and Low Rate of Complications Following Cystocele Correction Using a Lightweight, Large-Pore, Titanised Polypropylene Mesh. Geburtshilfe Frauenheilkd. 2019;79(09):959–68.

40. Rahkola-Soisalo P, Altman D, Falconer C, Morcos E, Rudnicki M, Mikkola TS. Quality of life after Uphold™ Vaginal Support System surgery for apical pelvic organ prolapse—A prospective multicenter study. European Journal of Obstetrics Gynecology Reproductive Biology. 2017;208:86–90.

41. Buca DIP, Liberati M, Falò E, Leombroni M, Di Giminiani M, Di Nicola M, Santarelli A, Frondaroli F, Fanfani F. Long-term outcome after surgical repair of pelvic organ prolapse with Elevate Prolapse Repair System. J Obstet Gynaecol. 2018;38(6):854–9.

42. Bartuzi A, Futyma K, Kulik-Rechberger B, Rechberger T. Self-perceived quality of life after pelvic organ prolapse reconstructive mesh surgery: prospective study. Eur J Obstet Gynecol Reprod Biol. 2013;169(1):108–12.

43. Houman J, Weinberger JM, Eilber KS. Native tissue repairs for pelvic organ prolapse. Curr Urol Rep. 2017;18(1):6.

44. Ethiopia CSAo: Ethiopia Demographic and Health Survey. 2016. Addis Ababa, Ethiopia, and Rockville, Maryland, USA: CSA and ICF 2016.
45. Assefa Y, Van Damme W, Williams OD, Hill PS. Successes and challenges of the millennium development goals in Ethiopia: lessons for the sustainable development goals. BMJ global health. 2017;2(2):e000318.

46. Olsen AL, Smith VJ, Bergstrom JO, Colling JC, Clark AL. Epidemiology of surgically managed pelvic organ prolapse and urinary incontinence. Obstetrics gynecology. 1997;89(4):501–6.

47. Özengin N, Çankaya H, Duygu E, Uysal MF, Bakar Y. The effect of pelvic organ prolapse type on sexual function, muscle strength, and pelvic floor symptoms in women: A retrospective study. Turkish journal of obstetrics gynecology. 2017;14(2):121.

48. Zielinski R, Miller J, Low LK, Sampselle C, DeLancey JO. The relationship between pelvic organ prolapse, genital body image, and sexual health. Neurourol Urodyn. 2012;31(7):1145–8.

49. Handelzalts JE, Yaakobi T, Levy S, Peled Y, Wiznitzer A, Krissi H. The impact of genital self-image on sexual function in women with pelvic floor disorders. European Journal of Obstetrics Gynecology Reproductive Biology. 2017;211:164–8.

50. Goodman MP, Placik OJ, Matlock DL, Simopoulos AF, Dalton TA, Veale D, Hardwick-Smith S. Evaluation of body image and sexual satisfaction in women undergoing female genital plastic/cosmetic surgery. Aesthetic surgery journal. 2016;36(9):1048–57.

51. Meriwether KV, Antosh DD, Olivera CK, Kim-Fine S, Balk EM, Murphy M, Grimes CL, Sleemi A, Singh R, Dieter AA. Uterine preservation vs hysterectomy in pelvic organ prolapse surgery: a systematic review with meta-analysis and clinical practice guidelines. American journal of obstetrics gynecology. 2018;219(2):129–46. e122.

52. Kenne K, Abreha M, Hart KD, Gregory WT, Nardos R: Surgical Management of Pelvic Organ Prolapse in Ethiopian Women: What Is the Preferred Approach? Female pelvic medicine & reconstructive surgery 2020, 26(2):e7-e12.

53. Mazi B, Kaddour O, Al-Badr A. Depression symptoms in women with pelvic floor dysfunction: a case-control study. International journal of women's health. 2019;11:143.

54. Larson KA, Smith T, Berger MB, Abernethy M, Mead S, Fenner DE, DeLancey JO, Morgan DM. Long-term patient satisfaction with michigan four-wall sacrospinous ligament suspension for prolapse. Obstet Gynecol. 2013;122(5):967–75.

55. Ghetti C, Lowder JL, Ellison R, Krohn M, Moalli P. Depressive symptoms in women seeking surgery for pelvic organ prolapse. Int Urogynecol J. 2010;21(7):855–60.

56. Pizarro-Berdichevsky J, Hitschfeld MJ, Pattillo A, Blumel B, Gonzalez S, Arellano M, Cuevas R, Alvo J, Gorodischer A, Flores-Espinoza C. Association between pelvic floor disorder symptoms and QoL scores with depressive symptoms among pelvic organ prolapse patients. Aust N Z J Obstet Gynaecol. 2016;56(4):391–7.

57. Richter HE, Goode PS, Kenton K, Brown MB, Burgio KL, Kreder K, Moalli P, Wright EJ, Weber AM, Network PFD. The effect of age on Short-Term outcomes after abdominal surgery for pelvic organ prolapse. J Am Geriatr Soc. 2007;55(6):857–63.
58. Bhandari M, Guyatt GH, Swiontkowski MF. User’s guide to the orthopaedic literature: how to use an article about a surgical therapy. JBJS. 2001;83(6):916–26.

59. Haynes RB, Sackett DL, Richardson WS, Rosenberg W, Langley GR. Evidence-based medicine: How to practice & teach EBM. Can Med Assoc J. 1997;157(6):788.

**Figures**

![Figure 1](image_url)

**Figure 1**

Quality of life before and after surgical repair of prolapse. The bar chart shows the figures for QoL at 3 and 6 months after surgery compared to patients’ QoL before surgery, where 100 corresponds to the lowest QoL. The QoL was itemized into a various domains. Changes in scores between the baseline and the 3 and 6 months follow-up period were all significant (p < 0.001).
Figure 2

Quality of life before and after surgical repair of prolapse using PRO instruments