Research Article

Surgical Outcomes of Cystectomy Using Oxidized Regenerated Cellulose With and Without Drainage in Endometrioma Treatment

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Abstract

Objective: To compare cystectomy and drainage using oxidized regenerated cellulose (ORC) in reducing endometrioma recurrence after surgery.

Methods: A retrospective cohort study included patients with endometrioma who undergo laparoscopic surgical management (cystectomy and drainage) with ORC from June 2020 – January 2023. All patients were followed up a year for recurrence rate. Recurrence was assessed based on symptoms and ultrasound criteria. All data were analyzed using SPSS version 26.0.

Results: Twenty-five patients were included in the cystectomy group and twenty-seven patients were included in the drainage group. The recurrence rate was higher in patients who underwent drainage (29.6%, n = 8) than in patients who underwent cystectomy (20%, n = 5). The researchers found the result was not significant ($p > 0.05$) in the recurrence rate between the two groups.

Conclusion: In this study, the use of oxidized regenerated cellulose showed no difference in recurrence rates in cystectomy with ORC and drainage with orc.

Keywords: endometrioma, cystectomy, drainage, oxidized regenerated cellulose.

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INTRODUCTION

Endometrioma is an inflammatory disease associated with pelvic pain and infertility characterized by lesions of endometrial-like tissue that grow outside the uterus especially in ovarian.[1] Patients with Endometrioma experience pain, infertility, and psychological and social impacts.[2] The current surgical treatment options for Endometrioma are cystectomy and drainage. Based on previous studies, the recurrence rate is lower in patients who undergo cystectomy than in drainage, although the post-operative recurrence rate remains high.[3,4] However, cystectomy is significantly associated with a reduction in ovarian reserve. On the other hand, drainage has the advantage of maintaining ovarian reserve.[4-8]

Currently, the mechanism of endometrioma recurrence is not clearly understood. However, the appearance of de novo Endometrioma and post-operative endometrioma residual tissue is believed to play a role in endometrioma recurrence. Post-operative hormonal therapy effectively prevents post-operative recurrence. However, post-operative hormone therapy is unsuitable for patients wishing to become pregnant immediately after surgery.[9] Other methods are needed to prevent recurrence rates and maintain ovarian reserves simultaneously. Oxidized Regenerated Cellulose (ORC) is considered for use in the surgical management of endometrioma. ORC is a topical absorbable

hemostatic agent widely used in surgery. In a previous study, endometrioma with cystectomy or drainage accompanied by ORC showed a lower recurrence rate.[4] In this study, we aimed to compare cystectomy with the use of ORC and drainage with the use of ORC on the outcome of postoperative recurrence.

METHODS

The current study was a retrospective cohort study conducted at Fatmawati Hospital was approved by institutional review board (Ethic research approval, No. PL.04.02/ DXXI.2/1143/2023). This study included patients with endometrioma who underwent surgical treatment (cystectomy and drainage) with Oxidized Regenerated Cellulose, examined from June 2020 – January 2023. Participants were divided into two groups: Cystectomy with the ORC group and drainage with the ORC group. Selection of surgical procedures is based on Anti-Mullerian Hormone (AMH) before the procedure, Endometrioma cyst size, and location (bilateral/ unilateral). Other endometriosis lesions, such as deep and superficial endometriosis, were completely excised. History taking and ultrasound examination were carried out to evaluate recurrence. Recurrence of endometrioma in this study is defined according to two criteria: symptom criteria and ultrasound criteria.[10] Recurrence based on symptoms is defined as dysmenorrhea, dyschezia, dyspareunia, and chronic pelvic pain, which recurs after surgery with a Visual Analogue Score (VAS) score equal to more than four or higher than before surgery.[10] Recurrence based on USG is defined as the appearance of endometrioma cyst findings of at least 3 cm after two consecutive menstrual cycles.[10] All patients were followed up for a year.

This current study uses SPSS version 26.0 for all analyses. Chi-Square test was used to assess the relationship between non-numeric variables. An independent sample t-test is used to assess the mean and standard deviation of the numerical variables. To compare the proportions of 2 groups of nominal scale variables, x-square test is used. Kolmogorov-Smirnov test was performed to assess the distribution of pre and post-operative pain scores by VAS. Furthermore, the dependent sample t-test was performed for normally distributed pre and post-operative VAS scores. The significant result is indicated by $p < 0.05$

RESULTS

In terms of cyst size, 14 patients (56%) in the cystectomy group and 14 patients (51.9%) in the drainage group had cysts larger than 6 cm, while 11 patients (44%) and 13 patients (48.1%) had cysts smaller than 6 cm, respectively. Primary infertility was reported in 23 patients (92%) in the cystectomy group and 25 patients (92.6%) in the drainage group, while secondary infertility was observed in 2 patients (8%) and 2 patients (7.4%), respectively. Regarding hormonal therapy, preoperative progestin was administered to 8 patients (32%) in the cystectomy group and 11 patients (40%) in the drainage group, while preoperative GnRH analog was given to 3 patients (12%) and 6 patients (22%), respectively. Postoperative progestin therapy was used in 6 patients (24%) in the cystectomy group and 7 patients (25.9%) in the drainage group, while postoperative GnRH analog therapy was given to 12 patients (48%) and 14 patients (51.9%), respectively. However, there was a significant difference in preoperative AMH levels between the groups, with the cystectomy group having a mean AMH level of 2.82 ± 1.83 ng/mL compared to 1.54 ± 1.19 ng/mL in the drainage group ($p<0.05$) as presented in Table 1. All VAS pre- and post-operative symptoms data are normally distributed. Our study found significant decreases in VAS scores on pre- and post-operative symptoms in both groups, except for dyspareunia in the drainage with ORC group (Figure 1 & 2).

Based on Table 2, the recurrence rate was higher in drainage with the ORC group (n = 8) than cystectomy with the ORC group (n = 5). The recurrence rate based on USG was higher in cystectomy with the ORC group (8%) than drainage with the ORC group (3.7%). On the other hand, recurrence rate based on symptoms and USG accompanied with symptoms were higher in drainage with the ORC group (14.8% & 11%) than drainage with the ORC group (4% & 8%). Our study found no significant difference between the two groups in the recurrence rate ($p > 0.05$).

Table 1. Demographic, Cyst Characteristic, and Fertility Profile

	Cystectomy with ORC n = 25	Drainage with ORC n = 27	*P-value*
Age	31.2 ± 3.12	33.7 ± 5.26	0.05
Menarche	12.24 ± 0.86	12.3 ± 0.86	0.05
Bilateral	16 (64%)	17 (63)	p>0.05
Unilateral	9 (36%)	10 (37)	p>0.05
> 6 cm	14 (56%)	14 (51.9)	p>0.05
< 6 cm	11 (44%)	13 (48.1)	p>0.05
Primary Infertility	23 (92%)	25 (92.6%)	p>0.05
Secondary Infertility	2 (8%)	2 (7.4%)	p>0.05
Preoperative Progestin	8 (32%)	11 (40%)	p>0.05
Preoperative GnRH Analog	3 (12%)	6 (22%)	p>0.05
Postoperative Progestin	6 (24%)	7 (25.9%)	p>0.05
Postoperative GnRH Analog	12 (48%)	14 (51.9%)	p>0.05
Pre operative AMH (ng/mL)	2.82 (± 1.83)	1.54 (± 1.19)	p<0.05

= *t*-test
= x^2-test.

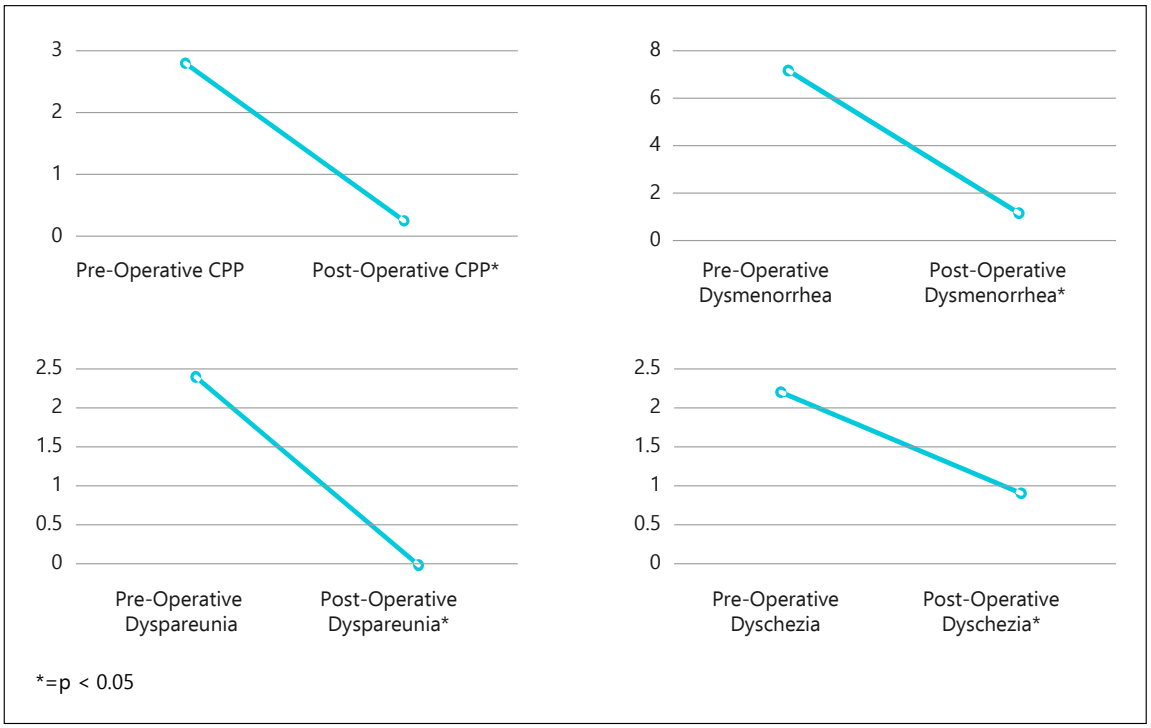

Figure 1. Pre and Post – Cystectomy Symptoms

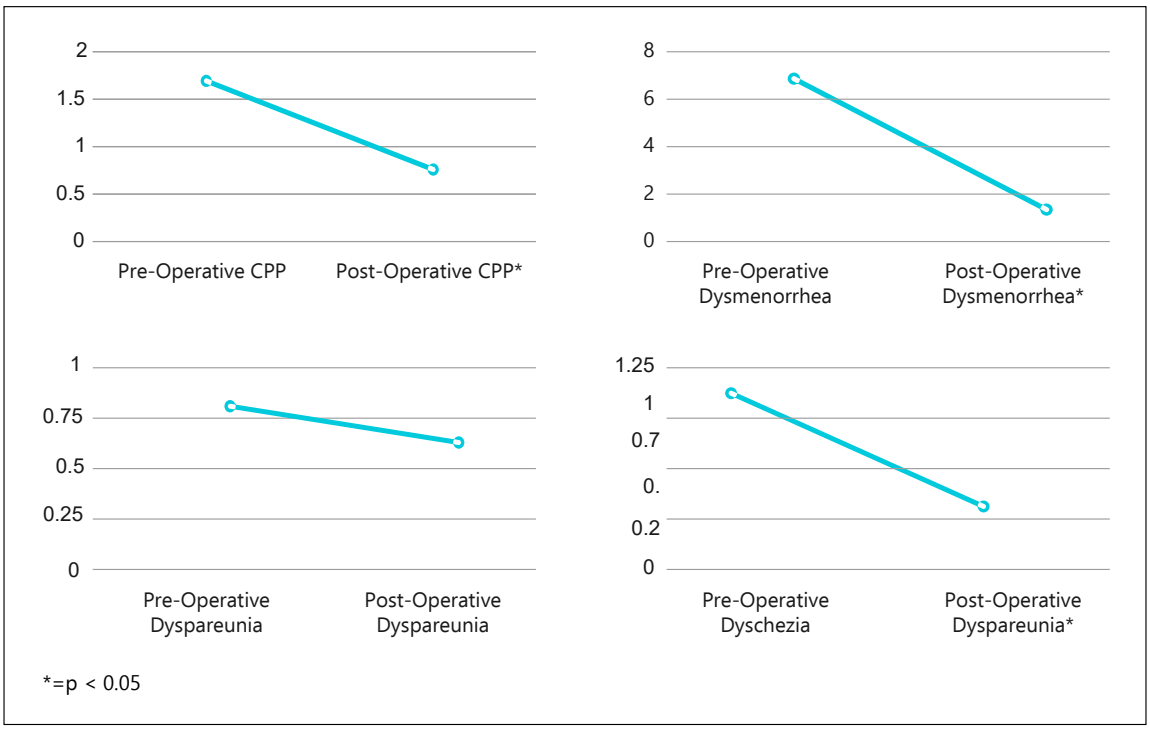

Figure 2. Pre and Post – Drainage Symptoms

Table 2. Recurrency Rate Characterisric

	Cystectomy with ORC n= 25 (%)	Cystectomy with ORC n= 25 (%)	*P-value*
USG	2 (8)	1 (3.7])	
Symptoms	1 (4)	4 (14.8)	>0.05
USG and Symptoms	2 (8)	3 (11.1)	
Total	5 (20)	8 (29.6)	

= x^2-test

DISCUSSION

Currently, the surgical management of endometrioma is still controversial. Several factors, such as recurrence, post-operative pain, and infertility, make performing surgery on patients with endometrioma challenging. The dilemma currently faced by surgeons in managing endometrioma is whether to maintain fertility or prevent recurrence. This study showed a significant difference in pre-operative AMH between the two groups. This significant difference is based on the choice of surgery, which refers to the amount of ovarian reserve or AMH levels. Cystectomy is performed in patients with AMH > 2 ng/mL, and drainage is performed in patients < 2 ng/mL. In this case, the consideration of the fertility function is the background of this matter. In this study, postoperative AMH levels were not evaluated. Some patients in both groups received hormonal therapy before surgery. This was done to reduce pain during the waiting period before surgery. Some patients in both groups also received hormonal therapy after surgery. However, the lack of consistency in hormonal therapy after surgery is one of the study's limitations.

Pain in endometrioma greatly reduces the patient's quality of life and increases the prevalence of anxiety and depression.[11] Pain in endometrioma is caused by endometrioma lesions and secondary lesions originating from scar and fibrosis. These things trigger an inflammatory process that will be responded to with proinflammatory production, activating sensory nerves and the nociceptive pathway.[12] In this study, there was a significant difference in pain (CPP, dysmenorrhea, dyspareunia, and dyschezia) between before and after surgery in both groups except dyspareunia in the drainage group. This reduction in pain correlates with the destruction of endometrioma lesions accomplished by both types of surgery and the absence of recurrence. In this study, all endometriosis lesions (deep

and superficial endometriosis) were completely excised. There was no significant difference in dyspareunia before and after surgery in the drainage group related to post-operative recurrence, characterized by dyspareunia in the drainage group.

Post-operative endometrioma recurrence is still a challenge for every surgeon until now. Several studies have defined recurrence differently; most have defined a definition based on symptoms, and several studies have defined a recurrence based on USG results.[10] As some researchers consider ultrasound findings alone to be insufficient, they have attempted to define endometrioma recurrence by combining ultrasound criteria with symptom criteria. Researchers studying endometrioma recurrence have been debating about how to define the size of the disease in ultrasound findings. In the past, studies have used ultrasound findings to define recurrence. They have defined recurrence as an endometrioma of at least 1.5 cm, 2 cm, or 3 cm. In this study, we defined recurrence as an endometrioma of at least 3 cm.[10] In the current study, various recurrences were observed by the two groups (Cystectomy with ORC group and Drainage with ORC Group). Recurrence based on USG findings was higher in the cystectomy group (8% vs. 3.7 %). On the other hand, recurrence based on symptom criteria and symptom followed by ultrasound findings was higher in patients who underwent drainage (14.8% & 11% vs. 4% & 8%). However, In this study, there was no significant difference in recurrence between the two groups (Cystectomy with ORC group and Drainage with ORC Group). Meanwhile, previous studies found that cystectomy only significantly reduced the recurrence rate compared to drainage only.[13,14] In this study, the absence of differences in recurrence rates between the two groups is associated with the use of ORC in both groups. The use of ORC significantly reduced the recurrence rate.[5] The underlying mechanism for this is that the acidic environment created by the ORC triggers a vasoconstriction process that makes residual endometrioma tissue and de novo endometrioma tissue experience anoxia.[15] Oxidized regenerated cellulose (ORC) is widely recognized as a hemostatic agent commonly used during surgery especially in brain and spine surgery.[16] However, over time, ORC has also been used with increasing frequency as an effective antimicrobial agent in the management of wounds with chronic infections.[17] Additionally, in the field of gynecologic surgery, ORC is now recognized for its effectiveness as an anti-adhesion agent. [18]

The main limitation in this study is the lack of researchers determining the calculation of the research sample, so that the research sample is found in a small amount. Larger research samples and multicenter studies can be carried out in future studies. The heterogeneity of medical treatment before and after surgery also made this a limitation in this study. So, in future studies, homogeneity must be considered to avoid bias. In addition, research over a year cannot conclude the best outcome from each surgical procedure, so conducting a study over a longer period is necessary.

CONCLUSION

In this study, the use of oxidized regenerated cellulose showed no difference in recurrence rates in cystectomy with ORC and drainage with ORC. Both of these techniques are effective in reducing endometrioma pain after surgery.

REFERENCES

1. Tomassetti C, Johnson NP, Petrozza J, Abrao MS, Einarsson JI, Horne AW, et al. An international terminology for endometriosis, 2021. J Minim Invasive Gynecol. 2021 Nov 1;28(11):1849–59.
2. Baczek G, Mietus M, Klimanek J, Tataj-Puzyna U, Sienkiewicz Z, Dykowska G, et al. The impact of endometriosis on the quality of women's life. Ginekol Pol. 2024;95(5):356–64.
3. Singh SS, Gude K, Perdeaux E, Gattrell WT, Becker CM. Surgical outcomes in patients With endometriosis: A Systematic Review. J Obstet Gynaecol Can. 2020 Jul;42(7):881-888.e11.
4. Shaltout MF, elsheikhah A, Maged AM, Elsherbini MM, Zaki SS, Dahab S, et al. A randomized controlled trial of a new technique for laparoscopic management of ovarian endometriosis preventing recurrence and keeping ovarian reserve. J Ovarian Res. 2019 Jul 20;12:66.
5. Saito N, Yamashita Y, Okuda K, Kokunai K, Terai Y, Ohmichi M. Comparison of the impact of laparoscopic endometriotic cystectomy and vaporization on postoperative serum anti-Mullerian hormone levels. Asian J Endosc Surg. 2018;11(1):23–9.
6. Mak KS, Huang YT, Weng CH, Wu KY, Lin WL, Wang CJ. Factors affected the ovarian reserve after laparoscopic cystectomy for ovarian endometriomas. Eur J Obstet Gynecol Reprod Biol. 2024 Dec 1;303:244–9.
7. Akhmad RF, Trisetiyono Y, Setiawan IEK, Pramono BA, Hadijono S, Mulyantoro I, et al. Ovarian reservation in women with ovarian endometriosis cyst after Laparoscopic Cystectomy and Leuprorelin Acetate Administration: Indones J Obstet Gynecol. 2023 Apr 30;87–92.

8. Sahabuddin R, Abdullah N, Manoe IM. Anti-Mullerian Hormone (AMH) Level as Ovarian Reserve Marker before and after Cystectomy Laparotomy. Indones J Obstet Gynecol. 2017 Jun 8;30–4.
9. Zakhari A, Delpero E, McKeown S, Tomlinson G, Bougie O, Murji A. Endometriosis recurrence following post-operative hormonal suppression: a systematic review and meta-analysis. Hum Reprod Update. 2020 Oct 6;27(1):96–107.
10. Ceccaroni M, Bounous VE, Clarizia R, Mautone D, Mabrouk M. Recurrent endometriosis: a battle against an unknown enemy. Eur J Contracept Reprod Health Care. 2019 Nov 2;24(6):464–74.
11. Szypłowska M, Tarkowski R, Kułak K. The impact of endometriosis on depressive and anxiety symptoms and quality of life: a systematic review. Front Public Health. 2023 Sep 6;11:1230303.
12. Maddern J, Grundy L, Castro J, Brierley SM. Pain in endometriosis. Front Cell Neurosci. 2020 Oct 6;14:590823.
13. Beretta P, Franchi M, Ghezzi F, Busacca M, Zupi E, Bolis P. Randomized clinical trial of two laparoscopic treatments of endometriomas: cystectomy versus drainage and coagulation. Fertil Steril. 1998 Dec 1;70(6):1176–80.
14. Alborzi S, Momtahan M, Parsanezhad ME, Dehbashi S, Zolghadri J, Alborzi S. A prospective, randomized study comparing laparoscopic ovarian cystectomy versus fenestration and coagulation in patients with endometriomas. Fertil Steril. 2004 Dec 1;82(6):1633–7.
15. Hutchinson RW, George K, Johns D, Craven L, Zhang G, Shnoda P. Hemostatic efficacy and tissue reaction of oxidized regenerated cellulose hemostats. Cellulose. 2013 Feb 1;20(1):537–45.
16. Deopujari CE, Ambekar S, Yetukuri BR, Diyora B, Ghosh A, Krishnan P, et al. Expert panel recommendations for topical hemostatic agent use in varied bleeding sites and situations during neuro-spine surgeries. J Clin Neurosci. 2024 Feb 1;120:30–5.
17. Momin M, Mishra V, Gharat S, Omri A. Recent advancements in cellulose-based biomaterials for management of infected wounds. Expert Opin Drug Deliv. 2021 Nov 2;18(11):1741–60.
18. Ahmad G, Kim K, Thompson M, Agarwal P, O'Flynn H, Hindocha A, et al. Barrier agents for adhesion prevention after gynaecological surgery. Cochrane Database Syst Rev. 2020 Mar 22;2020(3):CD000475.