

ORIGINAL ARTICLE

ULTRASOUND GUIDED ASPIRATION VERSUS ASPIRATION AND ABLATION OF OVARIAN CAVITY WITH METHOTREXATE

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Background: An ovarian cyst is a fluid filled sac formed in ovaries in 20% of females during their lifetime. The objective of the study was to compare the efficacy of ultrasound guided aspiration and ultrasound guided aspiration with ablation of cavity with methotrexate in treatment of ovarian cysts. **Methods:** This randomized controlled trial was designed and conducted in the Department of Obstetrics and Gynaecology, Gomal Medical Teaching Hospital, Dera Ismail Khan, Pakistan from 1st Jun 2019 to 30th Nov 2019. Eighty-eight women with ovarian cysts were randomly included with lottery method. The subjects were divided into 2 equal groups. The subjects in group A were subjected to ultrasound guided aspiration. The subjects in group B were subjected to ultrasound guided aspiration with ablation of cavity with methotrexate. Data was analysed on SPSS-22. Frequencies and percentages were computed for qualitative variables like efficacy. Mean±SD was presented for quantitative variables like age, size and duration of cyst. Chi-square test was applied to compare efficacy in both groups. Post stratification using Chi-square test for both groups was also applied. The results with $p \leq 0.05$ were considered statistically significant. **Results:** Efficacy was seen in 81.8% patients in group A as compared to 97.7% in group B ($p=0.01$). **Conclusion:** Transvaginal ultrasound guided aspiration and *in situ* methotrexate injection is simple, non-invasive and effective in the treatment of selected cases of simple ovarian cyst without evidence of malignancy.

Keywords: Ovarian cyst, Ultrasound guided aspiration, Methotrexate,

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INTRODUCTION

The adnexa have structures lying adjacent to uterus having fallopian tubes and ovaries. The ovaries are located lateral to the uterus through utero-ovarian ligament and covered by mesovarium. The ovaries produce various follicles per month but only one dominant follicle gets mature and undergoes ovulation in premenopausal women. An ovarian cyst, a fluid filled sac may form in ovaries as a result of this ovulation. The ovarian cysts are common as 20% of females may develop during their lifetime. Most of ovarian cysts are benign, functional, and no surgical intervention is needed. However, few of them may lead to complications i.e., cyst rupture, pelvic pain, hemorrhage, and ovarian torsion.¹ The differential diagnosis of ovarian cysts is dermoid cysts, functional cysts, and endometrioma. The ultrasonography is used for confirmatory diagnosis, size, and type of masses developed in ovaries. The evaluation also includes patient's history, physical examination, imaging studies, and laboratory findings.² However, these diagnostic measures need further improvement and research to standardize current therapeutic systems in practice.³ Ultrasound-guided diagnostic methods are usually minimally invasive, easily available, highly flexible, and have short duration of procedure.⁴

Ovarian needle aspiration is used to facilitate removal of cysts with minimal invasive approach. It is

the promising tool to evaluate and manage ovarian masses.⁵ Ultrasound-guided aspiration of simple ovarian cysts (<80 mm) is a diagnostic procedure allowing cytological examination and reducing surgical intervention.⁶ The studies concluded that the efficacy of ultrasound guided aspiration and ablation of cavity with methotrexate were 90.9% and 100% respectively in treatment of ovarian cysts.⁷⁻⁸ This study will provide an alternative treatment to laparoscopic cystectomy and open surgery in selected patients.

MATERIAL AND METHODS

This randomized controlled experimental study was designed and conducted in the Department of Obstetrics and Gynaecology, Gomal Medical Teaching Hospital, Dera Ismail Khan, Pakistan from 1st Jun 2019 to 30th Nov 2019. The sample size was calculated using WHO Sample Size Calculator for health studies with the following assumptions: Confidence Level 95%, alpha 5% (two-sided), with power 80%. While $p_1=84\%$ and $p_2=100\%$, where p_1 was the expected proportion in population 1 and p_2 was the expected proportion in population 2 of efficacy.⁸ Non-probability consecutive sampling was used for collection of samples. Eighty-eight women with ovarian cysts were randomly included with lottery method. The subjects were divided in 2 equal groups. The subjects in group A were subjected to ultrasound guided aspiration. The subjects in group B were subjected to ultrasound guided

aspiration with ablation of cavity with methotrexate. The patients aged 20–60 years having persistent ovarian cyst for at least 2 months with wall thickness (<5 mm) and size >5.0 Cm on ultrasound were included in the study. Pregnant women, cases with tumour marker (CA125 >35 U/ml), cases allergic to methotrexate, and cases with multilocular cysts, cysts with echoes, papillary projection, and septations on ultrasound were excluded from this study.

After getting informed written consent from the subjects, baseline demographic information of patients (age, size of ovarian cyst and duration of ovarian cyst) was recorded. A speculum was inserted to enable visualization of vaginal fornix and puncture site.

In group A, the needle guide was attached to the transducer that was covered with a condom. The transducer was then introduced into vagina; the procedure was done under endovaginal U/S guidance. A 16-gauge needle was used, 35 Cm long, attached to transvaginal probe. This procedure was essentially the same as that used for oocyte pick-up for IVF-ET. Once the needle was in the cyst, it was connected to a 50 cc syringe, and the cyst was evacuated completely. Re-examination was done with ultrasound to rule out incomplete evacuation or intra-abdominal haemorrhage. Cyst aspirates were sent for bacteriologic and cytologic examination.

In group B, after complete evacuation of the cyst as per above procedure, irrigation of the cyst was done with injecting methotrexate 50 mg in 3 ml normal saline under ultrasonic guidance. Patients were discharged 24 hours after procedure. Ultrasound examination was performed at 1, 3, and 6 months after the procedure. Efficacy was assessed after 6 months of procedure and recorded on specially designed proforma.

Data was entered and analyses using MS Excel and SPSS-22. For categorical variables like efficacy frequencies and percentages were calculated and for continuous variables like age, size of cyst, and duration of cyst Mean±SD were calculated. Stratification was done with regards to age, size of cyst, and duration of cyst to study the effect to these variables on efficacy. Post stratification using the Chi-square test for both groups was also applied. The results with $p \leq 0.05$ were considered as statistically significant.

RESULTS

The age of the subjects ranged from 20–60 years with mean age 32.97±6.32 years in group A, and 31.50±6.07 years in group B. The mean size of cyst was 7.72±1.30 Cm in group A and 7.81±1.18 Cm in group B. The mean duration of cyst was 4.43±1.10 months in group A and 4.34±1.18 months in group B (Table-1). The efficacy was seen in 81.8% patients in group A as compared to 97.7% in group B ($p=0.013$) (Table-2). The stratification of efficacy in both groups regarding age,

size of cyst, and duration of cyst are shown in Table-3, 4 and 5 respectively and resulted higher in group B.

Table-1: Demographic data of patients (n=88) (Mean±SD)

Demographics	Group A (n=44)	Group B (n=44)
Age (Yrs)	32.97±6.32	31.50±6.07
Size of cyst (Cm)	7.72±1.30	7.81±1.18
Duration of cyst (Months)	4.43±1.10	4.34±1.18

Table-2: Comparison of efficacy in both groups [n (%)]

Efficacy	Group A	Group B	P
Yes	36 (81.8)	43 (97.7)	0.01
No	8 (18.2)	1 (2.3)	
Total	44 (100)	44 (100)	

Table-3: Stratification of efficacy with respect to age in both groups [n (%)]

Groups/Age group	Yes	No	p
20–40 years			
A	32 (82.1)	7 (17.9)	0.02
B	40 (97.6)	1 (2.4)	
41–60 years			
A	4 (80)	1 (20)	0.4
B	3 (100)	0 (0)	

Table-4: Stratification of efficacy with respect to size of cyst in both groups [n (%)]

Group/Size of cyst	Yes	No	p
5–8 Cm			
A	25 (83.3)	5 (16.7)	0.05
B	34 (97.1)	1 (2.9)	
>8 Cm			
A	11 (78.6)	3 (21.4)	0.13
B	9 (100)	0 (0)	

Table-5: Stratification of efficacy with respect to duration of cyst in both groups [n (%)]

Group/Duration of cyst	Yes	No	p
2–6 Months			
A	34 (81)	8 (19)	0.00
B	41 (100)	0 (0)	
>6 Months			
A	2 (100)	0(0)	0.36
B	2 (66.7)	1 (33.3)	

DISCUSSION

Laparoscopic cystectomy is a well-known and common mode to treat benign ovarian cysts. Limited data is available on the effects of cystectomy procedure on ovarian reserve.⁹ Alexis laparoscopic management of giant ovarian cysts is only safe and feasible in few well-selected patients. However, the presence of multiple severe intra-abdominal adhesions is the main limit for converting this procedure into laparotomy.¹⁰ The current study evaluated the use of methotrexate injection versus aspiration only as a method of management in 88 patients with persistent simple ovarian cysts.

Combined use of serum cancer antigen 125 (CA-125) and transvaginal ultrasound for assessment of ovarian cyst nature increases the accuracy with a sensitivity of 94.4% and specificity of 100% while positive predictive value 100% and negative predicate value as 98.3%.¹¹

Methotrexate is an antimetabolite of folic acid. It is the treatment of choice for ectopic pregnancy

because of its low toxicity and known high catalytic effect. The risk of affecting the residual ovarian function with this procedure is low because methotrexate injection is intracystic and diffusion in the rest of ovary is limited.⁷ In the current study, the methotrexate dose was chosen arbitrarily and found that methotrexate injection had a significantly good effect on management of persistent simple ovarian cyst with no recurrence over 6 months as compared with transvaginal ultrasound aspiration alone ($p=0.01$).

A study by Gupta *et al*, has shown that efficacy of ultrasound guided aspiration and ablation of cavity with methotrexate was 90.9% in treatment of ovarian cysts.⁷ A randomized controlled study by Gergawy *et al* compared transvaginal ultrasound aspiration with efficacy of methotrexate injection in managing persistent simple ovarian cyst. Their study documented non-significant differences in the size of the cyst. The patients in methotrexate group had no cyst recurrence. However, 4 patients in aspiration only group developed recurrence within 6 months ($p=0.037$). The introduction of transvaginal intra-cystic methotrexate injection was an effective choice for managing persistent benign ovarian cyst. They reported efficacy of ultrasound guided aspiration as 84% as compare to 100% with ultrasound guided aspiration and ablation of cavity with methotrexate in treatment of ovarian cysts.⁸

It was found that methotrexate injection had no drawback over patient's fertility with non-significant difference as compared to transvaginal ultrasound aspiration only. Unfortunately, only a small sample of patients had a desire for future pregnancy. There was also a non-significant difference between methotrexate injection and transvaginal ultrasound aspiration alone with respect to complications. In the current study cyst relapse was observed in 4 out of 50 (8.0%) patients. The rates of recurrence after cyst aspiration alone reported in the literature range from 28.6% to 72.7%.⁷

The development of post-aspiration pelvic adhesion, as result of dissemination of the altered blood out of the cyst after aspiration is very difficult to predict. It cannot be judged whether the adhesion resulted from the procedure or *de novo*. The present study clearly indicates that *in situ* methotrexate injection has many advantages including short hospital stay, excellent

patient tolerance, less invasive than laparoscopic aspiration, and less morbidity. *In situ* methotrexate injection is a cost-effective alternative to the currently used methods for managing cystic ovarian mass particularly for high surgical risk patients.

CONCLUSION

Transvaginal ultrasound guided aspiration and *in situ* methotrexate injection is simple, non-invasive, safe, and effective in the treatment of selected cases of simple ovarian cyst without evidence of malignancy. It may provide an alternative treatment to laparoscopic cystectomy and open surgery in selected patients.

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