ELMER PRESS

Original Article

J Clin Gynecol Obstet. 2023;12(3):78-83

Transabdominal Ultrasound-Guided Tube Drainage of Pelvic Collection Following Obstetrics and Gynecological Surgery: Is It Safe and Effective?

Farida Bashir[a], Yasser Mesbah[b], Mohamed Mokhtar El-Morsy[b], Alaa Wageh[b, c]

Abstract

Background: There are some difficulties with transabdominal (TA) ultrasound (US)-guided drainage with the development of different methods of drainage (transvaginal). We aimed to evaluate the feasibility and effectiveness of TA US-guided drainage of pelvic fluid collection after gynecologic and obstetric surgeries.

Methods: We conducted this study on patients with postoperative pelvic fluid collections following gynecologic or obstetric surgery. We examined the cases at our Obstetrics and Gynecology Department in collaboration with the Radiology Department at the Gastroenterology Center over 12 months. We used imaging for the diagnosis of clinically symptomatic postoperative pelvic collection. All women underwent TA US-guided drainage by a standardized protocol. We monitored patients for at least 4 to 6 weeks and judged their outcomes according to the definitions of success and failure. We analyzed patient demographics, US, and clinical characteristics of the collection for their effects on clinical success.

Results: We had included 52 patients in the study. The number of resolved cases after US-guided intervention was 88%, while the number of failed cases was 12%. We observed no statistically significant association between outcome and onset after operation, duration before admission after onset, time of hospital admission after operation, and time of intervention after diagnosis. There was no statistically significant association between the outcome and US findings and the nature and culture of aspirated fluid. The presence of associated comorbidities significantly affects the success of the procedure.

Conclusions: TA US-guided drainage of pelvic fluid collections is effective and safe in women's management with infected pelvic fluid collections. The presence of comorbidities in the cases may interfere with the resolution of the abscess and failure of the procedure.

Keywords: Ultrasound-guided; Pelvic collection; Postoperative

Manuscript submitted August 29, 2023, accepted December 8, 2023
Published online December 28, 2023

[a]Obstetrics and Gynecology, Kfr Saad General Hospital, Mansoura, Egypt
[b]Obstetrics and Gynecology Department, Faculty of Medicine Mansoura University, Mansoura, Egypt
[c]Corresponding Author: Alaa Wageh, Obstetrics and Gynecology Department, Faculty of Medicine Mansoura University, Mansoura, Egypt.
Email: wagehalaa@yahoo.com

doi: https://doi.org/10.14740/jcgo903

Introduction

After gynecologic and obstetric surgeries, fluid collections are common ultrasound (US) findings with varying degrees of morbidity [1]. US is crucial for the evaluation of such pelvic collections [2]. US safely drains postoperative pelvic fluid collections in symptomatic patients, and it is a method that has become one of the standard treatment care [3]. There are some difficulties with transabdominal (TA) US-guided drainage with the development of different routes of drainage through the vagina, rectum, perineum, and gluteal region [4]. In our institute, we considered the abdominal route the most familiar route for the management of this problem over the years. Our aim of this study is to evaluate the feasibility and effectiveness of TA US-guided drainage of pelvic fluid collection after gynecologic and obstetric surgeries.

Materials and Methods

We conducted this study on patients with postoperative pelvic fluid collections following gynecologic or obstetric surgery. We examined the cases at the Obstetrics and Gynecology Department in collaboration with the Radiology Department at the Gastroenterology Center, Mansoura University Hospital (MUH), Egypt, over 12 months. The Institution Research Board (MS/17.08.84) approved the study protocol. The study was conducted in compliance with the ethical standards of the responsible institution on human subjects as well as with the Helsinki Declaration.

We excluded patients with severe diffuse peritonitis or septic shock who need urgent surgery, and patients with a pelvic collection not amenable to US-guided tube drainage because of injury to an organ, nerve, or vessel from the study.

We used imaging such as US, computed tomography (CT), or magnetic resonance imaging (MRI) of pelvic collection for diagnosis of clinically symptomatic postoperative pelvic col-

lection after gynecologic or obstetric surgery. After the diagnosis, the method of treatment is determined as either surgical or US-guided drainage.

The US equipment we used was Toshiba Xario200 and Pigtail catheters.

The standardized protocol used in managing all women who underwent US-guided drainage was: 1) We treated every patient with prophylactic systemic antibiotics (2 g of amoxicillin plus clavulanic acid) before the procedure; 2) The target lesion was well defined by pelvic imaging studies; 3) We employed color Doppler to ensure the absence of vessels at the puncture site; 4) The interventional radiologist decided on the size of catheters used, based on the aspirated fluid and the size of the cavity; 5) The catheter sizes ranged from 8 to 12 F, and we placed pigtail drainage catheters in the cavity using the Seldinger technique or trocar method. If the drainage was insufficient, we replaced the catheter using an over-the-guidewire technique with a thicker one [5]; 6) We attached bags for gravity drainage after placing a stopcock at the external end of the catheter for irrigation; 7) Abscess cavities were irrigated with natural saline using drainage tubes about 1 week after the procedure; 8) We administer oral broad-spectrum antibiotics for 3 to 5 days after the procedure, followed by adjustments based on the culture and sensitivity test; 9) We removed the catheter after confirming the complete resolution of the fluid collection.

We defined the complete resolution of the pelvic collection as the radiological disappearance of the cavity and the clinical disappearance of the symptoms. We monitor patients for at least 4 to 6 weeks, and we judge their outcomes either success or failure. We defined success as the complete resolution of the pelvic collection after one or more with no surgery. We defined failure as the need for elective interval surgery or emergency surgery after US-guided drainage.

Statistical analysis

We analyzed data using SPSS program for Windows (version 26). The normality of data was tested with a one-sample Kolmogorov-Smirnov test. Continuous variables were showed as mean ± standard deviation (SD) for normally distributed data. The association between categorical variables was tested using the Fisher exact test and Monte Carlo test when the expected cell count was less than 5. We compared the groups with an independent *t*-test for parametric data. The threshold of significance is at a 5% level. We considered the results significant when $P \leq 0.05$.

Results

We included 52 patients in the study. Twenty-eight had cesarean section (CS), 16 had laparotomy, seven after laparoscopy, and only one case after ovum pickup. Table 1 shows the patients' data, US echogenicity, admission data, and laboratory investigation.

The percentage of resolved cases after US-guided intervention was 88%, while that of failed cases was 12%. The median duration of hospital stay was 7 days, ranging from 4 to 60 days. The presence of associated comorbidities significantly affected the success of the procedure.

Tables 2, 3 show the association between patients' data, admission data, investigation, and outcome. We observed no statistically significant association between outcome and onset after operation, duration before admission after onset, time of hospital admission after operation, and time of intervention after diagnosis.

There was a statistically significant association between outcome and white blood cells (WBCs) and platelet count before the procedure. Failed cases had higher WBCs (12.37 ± 1.65) compared to those (9.97 ± 2.89) in resolved cases. The mean platelets count was higher among the failed cases (409.0 ± 199.7) compared to those (284.9 ± 128.9) among the resolved ones.

There was no statistically significant association between the outcome and the US findings. There was no statistically significant association between outcome and the nature and culture of aspirated fluid.

Discussion

Postoperative pelvic collection occurs as a complication in 1% of patients [6]. US-guided drainage of pelvic abscesses is evolving as an alternative to surgical methods of drainage [7]. The success rate of our study (88%) through the TA route shows that it is a proper and familiar choice for drainage. This method of drainage is challenging as the bony barrier, neurovascular structures, as well as the bladder, uterus, vagina, and rectum surround the pelvis [7]. Transrectal or transvaginal drainage of the pelvic collection can be a promising option to overcome these difficulties. Transvaginal drainage of pelvic collections clinical success rate may reach up to 100% [8], but these methods are often under-used where expertise in techniques is limited. The availability of radiologists familiar with the technique, concern about the effectiveness, and long-term complication are likely to be reasons for the limited use of these procedures [9].

Our result is comparable to similar trials in literature. Akinci et al stated that TA image-guided drainage has high clinical success (93.9%) and low rates of minor complications (6.7%). The only factor affecting their clinical success was the presence of a fistula [10]. In a recent meta-analysis of eight studies with 135 patients, the rate of clinical success of TA image-guided drainage was 92% [11].

In addition, the current study showed that most of the failed cases were associated with comorbidities. In line with our study, Ilyas et al stated that the results of the drainage procedure appear to depend on the etiology of the abscess. They also found that the only case that required an additional surgical drainage procedure was associated with comorbidity (the patient had a pelvic abscess from a post-ileal pouch-anal anastomosis leak). They also mentioned that the follow-up of this case did not present any significant long-term sequelae [9].

Regarding the number of cases included in our study, it

Table 1. The Patients' Data, Ultrasound Echogenicity, Admission Data, and Laboratory Investigation

	Results
Age (years), mean ± SD (Min - Max)	33.36 ± 8.35 (21 - 56)
< 30, n (%)	20 (38.46%)
≥ 30, n (%)	32 (61.53%)
Previous cesarean section (CS)	
No CS, n (%)	13 (25)
1 - 3 CS, n (%)	31 (59.6)
> 3 CS, n (%)	8 (15.4)
Previous ectopic pregnancy, n (%)	3 (5.8)
Comorbidities, n (%)	12 (23.1)
Type of operation	
CS, n (%)	28 (54)
Laparotomy, n (%)	16 (31)
Laparoscopy, n (%)	7 (13)
Ovum pickup, n (%)	1 (2)
Onset after operation: mean ± SD (Min - Max)	11.2 ± 6.8 (2 - 27)
Echogenicity of US	
Homogenous, n (%)	18 (35%)
Heterogonous, n (%)	34 (65%)
Number of locules	
Unilocular, n (%)	40 (77%)
Multilocular, n (%)	12 (23%)
Size of mass by US (mm^2), mean ± SD (Min - Max)	70.71 ± 59.9 (18 - 360)
Nature of aspirated fluid	
Serous fluid, n (%)	4 (8%)
Pus, n (%)	41 (79%)
Hemorrhagic tinged with pus, n (%)	7 (13%)
Culture	
No bacterial growth, n (%)	4 (8%)
Gram- bacilli, n (%)	38 (73%)
Gram+ cocci, n (%)	10 (19%)
Duration before admission after onset, mean ± SD (Min - Max)	3.6 ± 2.2 (0 - 13)
Time of hospital admission after operation, mean ± SD (Min - Max)	14.6 ± 7.3 (4 - 30)
Time of intervention after diagnosis, mean ± SD (Min - Max)	4.1 ± 2.4 (1 - 10)
Laboratory investigations	
Hb (g/dL), mean ± SD (Min - Max)	9.26 ± 1.08 (6.70 - 12.10)
WBCs (× $10^3/mm^3$), mean ± SD (Min - Max)	10.24 ± 2.87 (5.00 - 20.40)
PLTs (× $10^3/mm^3$), mean ± SD (Min - Max)	301.29 ± 138.55 (119.00 - 744.00)

SD: standard deviation; Min: minimum; Max: maximum; Hb: hemoglobin; US: ultrasound; WBC: white blood cells; PLT: platelet.

is quite enough to conclude the data when compared to other studies. Other studies evaluating the effect of US-guided drainage showed a similar number of cases. Poincloux et al evaluated 37 patients, Puri et al evaluated 30 patients, Meylemans et al studied 46 patients, and Ramesh et al studied 38 patients [12-15].

In addition, when analyzing the onset of the abscess after the operation, duration before admission after onset, time of hospital admission after the operation, time of intervention after diagnosis, and duration of hospital stay and correlating

Table 2. The Association Between Patients' Data and Outcome

Demographic and obstetric data	Outcome		P value
	Resolved (n = 46)	Failed (n = 6)	
Age (years)			
< 30, n = 20	19 (95.0%)	1 (5.0%)	0.387
≥ 30, n = 32	27 (84.4%)	5 (84.4%)	
Cesarean section (CS)			
No CS, n = 13	12 (92.3%)	1 (7.7%)	0.564
1 - 3 CS, n = 31	28 (90.3%)	3 (9.7%)	
> 3 CS, n = 8	6 (75.0%)	2 (25.0%)	
Ectopic pregnancy			
Yes, n = 49	44 (89.8%)	5 (10.2%)	0.313
No, n = 3	2 (66.7%)	1 (33.3%)	
Comorbidities			
Yes, n = 12	8 (66.7%)	4 (33.3%)	0.021*
No, n = 40	38 (95.0%)	2 (5.0%)	
Type of operation			
CS, n = 28	26 (92.9%)	2 (7.1%)	
Laparotomy, n = 16	12 (75.0%)	4 (25.0%)	0.216
Laparoscopy, n = 7	7 (100%)	0 (0%)	
Embryo ovum pickup, n = 1	1 (100%)	0 (0%)	
Echogenicity of US			
Homogenous, n = 18	15 (83.3%)	3 (16.7%)	
Heterogonous, n = 34	31 (91.2%)	3 (8.8%)	0.651
Number of locules			
Unilocular, n = 40	35 (87.5%)	5 (12.5%)	
Multilocular, n = 12	11 (91.6%)	1 (8.3%)	1
Size of mass by US (mm^2), mean ± SD	70.65 ± 63.62	71.17 ± 15.94	0.984
Nature of aspirated fluid			
Serous fluid	3 (75.0%)	1 (25.0%)	
Pus	36 (87.8%)	5 (12.2%)	
Hemorrhagic tinged with pus	7 (100%)	0 (0%)	0.586
Culture			
No bacterial growth	3 (75.0%)	1 (25.0%)	
Gram- bacilli	9 (90.0%)	1 (10.0%)	
Gram+ cocci	34 (89.5%)	4 (10.5%)	0.751

*P < 0.05. SD: standard deviation; US: ultrasound.

these factors to the outcome, the analysis revealed that there is no significance between the groups. This is consistent with the study of Meylemans et al, who investigated the same topic [15].

Our results showed that the number of locules and the abscess size did not affect the outcome. In the same line, Akinci et al compared the abscess structure either unilocular or multilocular in the resolved cases and failed cases, and they found no significance between the groups [10]. On the other hand, other studies found that the presence of a single unilocular abscess is easier to drain than a multilocular one [16, 17]. Such findings may be due to the fact that the US facilitates the drainage of the collection, regardless of the size of the cavity or the presence of the septum in it.

In our study, the nature of aspirated fluid, either serous fluid, pus, or hemorrhagic tinged with pus, did not show a significant difference in the procedure's success. However, the investigations of cases showed that the number of WBCs and

Table 3. The Association Between Admission Data, Investigation, and Outcome

Variables	Outcome		Test of significance	P value
	Resolved (n = 46)	Failed (n = 6)		
Onset after operation	10.63 ± 6.71	15.83 ± 6.3	t = 1.79	0.078
Duration before admission after onset	3.63 ± 2.32	3.67 ± 1.03	t = 0.037	0.970
Time of hospital admission after operation	14.00 ± 7.16	19.0 ± 7.53	t = 1.60	0.116
Time of intervention after diagnosis	4.04 ± 2.41	4.17 ± 2.31	t = 0.118	0.906
Duration of hospital stay	7.39 ± 1.79	16.50 ± 2.13	t = 3.02	0.004*
Hb (g/dL)	9.33 ± 0.95	8.78 ± 1.85	t = 1.168	0.248
WBCs ($\times 10^3/mm^3$)	9.97 ± 2.89	12.37 ± 1.65	t = 1.976	0.05*
PLTs ($\times 10^3/mm^3$)	284.9 ± 128.9	409.0 ± 199.7	t = 2.077	0.043*

*P ≤ 0.05. Hb: hemoglobin; WBC: white blood cells; PLT: platelet.

platelets was higher in the failed cases while hemoglobin (Hb) concentration was not. Which may be explained by the presence of active infection. Unlike, Okita and his colleague found that a higher WBC count tended to be associated with successful drainage [16].

In conclusion, TA US-guided drainage of pelvic fluid collections is effective in the management of women with infected pelvic fluid collections. It is a minimally invasive procedure and a workable option, with a lower rate of complications than surgical drainage. The presence of comorbidities or high number of WBCs and platelets in the cases may interfere with the resolution of the abscess and failure of the procedure.

Acknowledgments

None to declare.

Financial Disclosure

None to declare.

Conflict of Interest

Authors declare that there is no conflict of interest.

Informed Consent

Written informed consent was taken from the participants.

Author Contributions

Dr. Farida Bashir: data collection. Professor Dr. Yasser Mesbah: idea creation, supervision, and data interpretation. Dr. Mohamed Mokhtar El-Morsy: data collection and clinical examination. Dr. Alaa Wageh: clinical examination, data interpretation, and manuscript writing.

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

References

1. Antonelli E, Morales MA, Dumps P, Boulvain M, Weil A. Sonographic detection of fluid collections and postoperative morbidity following Cesarean section and hysterectomy. Ultrasound Obstet Gynecol. 2004;23(4):388-392. doi pubmed
2. Verma A, Shrivastava N, Sharma G, Sharma A. Sonographic detection of surgical site fluid collections and postoperative maternal morbidity following cesarean section. Cureus. 2023;15(3):e36836. doi pubmed pmc
3. Stahl R, Seidensticker M, de Figueiredo GN, Pedersen V, Crispin A, Forbrig R, Ozpeynirci Y, et al. Low-dose CT fluoroscopy-guided drainage of deep pelvic fluid collections after colorectal cancer surgery: technical success, clinical outcome and safety in 40 patients. Diagnostics (Basel). 2023;13(4):711. doi pubmed pmc
4. Ballard DH, Gates MC, Hamidian Jahromi A, Harper DV, Do DV, D'Agostino HB. Transrectal and transvaginal catheter drainages and aspirations for management of pelvic fluid collections: technique, technical success rates, and outcomes in 150 patients. Abdom Radiol (NY). 2019;44(7):2582-2593. doi pubmed pmc
5. Akinci D, Akhan O, Ozmen MN, Karabulut N, Ozkan O, Cil BE, Karcaaltincaba M. Percutaneous drainage of 300 intraperitoneal abscesses with long-term follow-up. Cardiovasc Intervent Radiol. 2005;28(6):744-750. doi pubmed
6. Krajnc K, Takac I, Mujezinovic F, Horvat M, Kuder L. Case report: pelvic abscess after cesarean section and hysterectomy. Acta Medico-Biotechnica. 2020;13(1):69-72.
7. Adler DG, Lanke G. Clinical update on the role of EUS in pelvic abscess. Pract Gastroenterol. 2020;44:32-41.
8. Ching KC, Sumkin JH. Transvaginal drainage of pelvic

abscesses and collections using transabdominal ultrasound guidance. Obstet Gynecol Int. 2015;2015:283576. doi pubmed pmc
9. Ilyas MI, Kandagatla P, Reickert CA, Nalamati S, Webb SP, Szilagy EJ, Stefanou AJ. Safety of transrectal or transvaginal drainage of pelvic abscesses. Journal of Coloproctology (Rio de Janeiro). 2021;41:47-51.
10. Akinci D, Ergun O, Topel C, Ciftci T, Akhan O. Pelvic abscess drainage: outcome with factors affecting the clinical success. Diagn Interv Radiol. 2018;24(3):146-152. doi pubmed pmc
11. Dhindsa BS, Naga Y, Saghir SM, Dhaliwal A, Ramai D, Cross C, Singh S, et al. EUS-guided pelvic drainage: A systematic review and meta-analysis. Endosc Ultrasound. 2021;10(3):185-190. doi pubmed pmc
12. Poincloux L, Caillol F, Allimant C, Bories E, Pesenti C, Mulliez A, Faure F, et al. Long-term outcome of endoscopic ultrasound-guided pelvic abscess drainage: a two-center series. Endoscopy. 2017;49(5):484-490. doi pubmed
13. Puri R, Choudhary NS, Kotecha H, Shah SP, Paliwal M, Misra SR, Bhagat S, et al. Endoscopic ultrasound-guided pelvic and prostatic abscess drainage: experience in 30 patients. Indian J Gastroenterol. 2014;33(5):410-413. doi pubmed
14. Ramesh J, Bang JY, Trevino J, Varadarajulu S. Comparison of outcomes between endoscopic ultrasound-guided transcolonic and transrectal drainage of abdominopelvic abscesses. J Gastroenterol Hepatol. 2013;28(4):620-625. doi pubmed
15. Meylemans DVG, Oostenbrug LE, Bakker CM, Sosef MN, Stoot J, Belgers HJ. Endoscopic ultrasound guided versus surgical transrectal drainage of pelvic abscesses. Acta Chir Belg. 2018;118(3):181-187. doi pubmed
16. Okita Y, Mohri Y, Kobayashi M, Araki T, Tanaka K, Inoue Y, Uchida K, et al. Factors influencing the outcome of image-guided percutaneous drainage of intra-abdominal abscess after gastrointestinal surgery. Surg Today. 2013;43(10):1095-1102. doi pubmed pmc
17. vanSonnenberg E, Wittich GR, Goodacre BW, Casola G, D'Agostino HB. Percutaneous abscess drainage: update. World J Surg. 2001;25(3):362-369; discussion 370-362. doi pubmed