Original Article

Do Patients With Blocked Tubes Experience More Pain During Outpatient Hysteroscopy Than Those With Patent Tubes?! A Prospective Comparative Study

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ABSTRACT

Objective: To study the impact of tubal blockage on pain experienced during and immediately after diagnostic outpatient hysteroscopy.
Study design: A prospective comparative study (Canadian Task Force Classification II-2).
Setting: Outpatient hysteroscopy clinic at a University Hospital.
Patients and Methods: We included 140 women in the childbearing period attending outpatient hysteroscopy clinic for infertility or recurrent miscarriage. Patients were divided into two equal groups; Group- A included those with unilateral or bilateral tubal block (n=70) and Group-B included those with patent tubes on both sides (*n* =70). All patients had diagnostic outpatient hysteroscopy without the use of anaesthesia or analgesia**.** Outcomes measured included pain experienced during and immediately after the procedure assessed using a 100 mm -Visual Analogue Scale (VAS) and the successful completion of the procedure.
Results: Patients with blocked tubes experienced statistically significant more pain than those with patent tubes both during and immediately after the procedure using a uterine filling pressure of 80 -100 mmHg. However, all procedures were successfully completed with no failures or complications.
Conclusion: Blocked Fallopian tubes contribute to pain during and immediately after outpatient hysteroscopy when a uterine filling pressure of 80- 100 mmHg is used. However, this didn't adversely affect the success rate of the procedure. For this group of patients, strategies to improve patients' satisfaction need to be studied with a special attention for; the use of lower uterine filling pressures, shortening the procedure duration and/or the use of preemptive analgesics.

Key Words: analgesics, blocked tubes, outpatient hysteroscopy, pain, patent tubes.

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INTRODUCTION

Outpatient hysteroscopy (OH) has become a mainstay in modern gynecological practice. In reproductive setting, it has become an invaluable tool for the assessment of uterine cavity in patients with infertility, recurrent implantation failure and recurrent miscarriage. In a study by Campo *et al*., in 2005, infertility was the indication of the procedure in 46 % of patients[1].

OH has been described as a well-tolerated procedure that doesn't require anaesthesia or routine use of analgesia[2]. Nevertheless, many studies have described the procedure as being painful and supported the routine use of analgesics to minimize pain and enhance the tolerability of the procedure[3, 4]. Yet, Cicinelli, 2010, suggested that the procedure is well-tolerated in most cases and that analgesics is required only in selected cases who are more likely to experience unacceptable pain during the procedure[5].

Although the technique of OH has been refined with the use of miniaturized hysteroscopes and vaginoscopic approach[6], pain is still recognized as a limitation of the procedure. The variation in pain experienced by patients despite refinement of the technique may partly be attributed to specific patient related factors. Predicting patients who are more likely to experience pain during OH may allow considering special strategies to minimize their pain and improve their satisfaction e.g. administration of preemptive analgesics or using lower uterine filling pressure.

Many patient characteristics have been evaluated to identify predictive factors for pain experienced during OH including level of anxiety, menopausal state, parity, chronic pelvic pain, history of previous cesarean delivery and body mass index (BMI)[7-11]. However, there is no report

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in the literature on the impact of tubal blockage on pain experienced during the procedure.

This work aims to study the association between tubal blockage and pain experienced during and immediately after OH.

PATIENTS AND METHODS

This is a prospective observational study carried out at the OH clinic of the department of Obstetrics and Gynecology at Cairo University Hospital in the period from August 2015 till May 2016. The study was approved by the research ethics committee of Cairo University Hospital. All patients provided their written informed consent.

Inclusion criteria

We included women in the childbearing period attending OH clinic for either infertility or recurrent miscarriage. All patients had hysterosalpingogram (HSG) for the assessment of tubal patency and uterine cavity as part of the routine work up of their complaint. Only nulliparous women with no previous uterine scar were enrolled. All patients included were subjected to the procedure for the first time. All procedures were done by the same hysteroscopist to eliminate bias related to the operator.

Exclusion criteria

We excluded postmenopausal women, parous women, women with uterine scar and those with unavailable data on tubal patency. Alike, patients who had previous OH or dilatation and curettage and those who received any type of analgesics in the past 24 hours were also excluded.

We divided patients into two equal groups; Group-A included patients with unilateral or bilateral tubal block (*n*=70) and Group B included patients with bilaterally patent tubes (*n*=70). Group A was further subdivided into patients with unilateral or bilateral tubal block, and those with distal or proximal tubal block.

Patients' perception of pain during and immediately after OH was assessed at the end of the procedure using a 100 mm visual analogue scale (VAS) with 5 mm increments (i.e. 0, 5, 10, …etc.) with one end denoting "*no pain at all*" and the other end denoting "*worst pain ever*". Patients were interviewed by an independent nurse who was blinded to the study and to the HSG findings. Patients were asked to mark the point that corresponds to their pain. The degree of pain was categorized as follow; VAS of 0=no pain, 5- 25=minimal pain, 30 -50= mild pain, 55- 75=moderate pain, 8095-=severe pain, 100=severe unbearable pain that required aborting the procedure.

The procedure was performed in the lithotomy position, using a 30-degree angle 2.9 mm rigid hysteroscope with 3.8 mm diagnostic sheath [Karl Storz®, Germany]. We used the vaginoscopic approach for introducing the hysteroscope. After visualization of the cervix and identification of the external os, the hysteroscope was gently and slowly introduced through the cervix into the uterine cavity. The uterine cavity and tubal ostia were systematically visualized by clockwise and anticlockwise rotation of the hysteroscope**.** We used saline as the distension medium and maintained its pressure between 80-100 mmHg.

All procedures were diagnostic with no operative intervention. Throughout the procedure, a verbal communication was maintained with the patient to explain findings and notice her response to pain. All patients shared similar socio-economic background.

Statistical analysis

To the best of our knowledge, this is the first study to evaluate the impact of tubal blockage on pain experienced during OH. Assuming that the response would be normally distributed, the sample size was calculated to detect a mean difference of 10 units between the pain score of "patent tubes group" and "blocked tubes group" during the procedure (a lower difference was not considered clinically relevant) using the VAS assuming that the within group standard deviation would be 20. We would need to study 64 cases in each group to be able to reject the null hypothesis that the population means of the "blocked tubes group" and the "patent tubes groups" are equal, with a probability (power) of 0.8. We added 6 cases to each arm accounting for any missing data, giving 70 cases in each group. The Type I error probability associated with this test of this null hypothesis is 0.05 using the Student's t test for independent samples. Sample size calculation was carried out using Stats Direct statistical software version 2.7.2 for MS Windows (Stats Direct L^{td}., Cheshire, UK).

Data were statistically described in terms of mean ± standard deviation (±SD), or frequencies and percentages when appropriate. Comparison of numerical variables between the study groups was done using the independent student'st-test. For comparing categorical data, Chi square test was performed. Exact test was used instead when the expected frequency is less than 5. We conducted multivariate regression analysis to test for the preferential effect of all important variables on the degree of pain during and immediately after the procedure including age, gravidity, BMI, intrauterine (IU) lesion and tubal patency. *P* values <0.05 were considered statistically significant. All statistical calculations were done using computer program SPSS (Statistical Package for the

Social Science; SPSS Inc., Chicago, IL) release 15 for Microsoft Windows (2006). significant..

RESULTS

We recruited 140 patients who were divided equally into two groups. Both groups were similar in the baseline characteristics with no significant differences. During and immediately after the procedure, patients with blocked tubes had statistically significant more pain scores than those with patent tubes ($p< 0.001$, $p< 0.001$) with a mean difference of 16.4, 11.1and 95% confidence interval (CI) [7.8, 25] and [6.3, 15.7], respectively (Table 1).

Proportion of patients who had no pain, minimal, mild, moderate, severe pain and severe intolerable pain is shown in Figure 1. Larger proportions of patients who had no or minimal pain were in the patent tube group while larger proportions of patients who had mild, moderate and severe pain were in the blocked tube group.

There were no statistically significant differences in the pain scores during and immediately after the procedure between subgroup of patients with IU lesions and those without ($p= 0.678$, $p=0.966$) with a mean difference of 1.9, 0.1 and 95% CI [-7.3, 11.2] and [-5.1, 5.3], respectively (Table 2).

No statistically significant difference in pain scores between patients with unilateral and bilateral tubal block during and immediately after the procedure ($p= 0.494$, $p = 0.596$) with a mean difference of 3.9, 1.8 and 95% CI of [-7.5, 15.4] and [-5.1, 8.8], respectively (Table 3). Patients with distal tubal block had slightly higher mean pain scores than those with proximal tubal block during and immediately after the procedure, but this was not statistically significant ($p= 0.426$, $p= 0.372$). The mean difference was 5.8, 4 and 95% CI of [-8.7, 20.4], [-4.8, 12.9], respectively (Table 4).

None of the patients in either group experienced severe intolerable pain that required aborting the procedure. All procedures were successfully completed with no complication or failure.

Multivariate regression analysis showed that only age and tubal patency were found effectors ($p< 0.05$) where older age and blocked tubes were associated with more pain (Table 5).

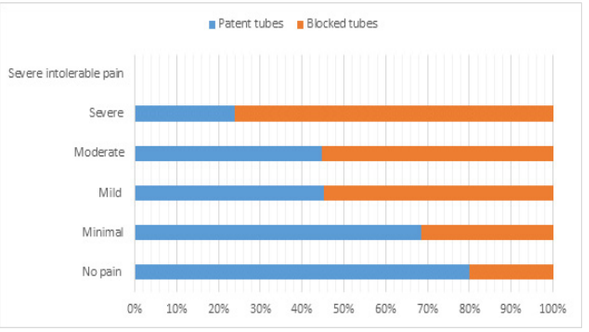

Figure 1: Proportion of patients according to degree of pain

Table 1: Baseline characteristics and pain scores of the groups*

	Blocked tubes (n=70)	Patent tubes (n=70)	*P* value
Age	30.6 ± 5.4	28.9 ± 5.5	0.064
Gravidity	0.6 ± 1	0.6 ± 1.6	0.806
Body mass index	29.4 ± 4.2	28.7 ± 4.6	0.407
Proportion of women with infertility	67 (95.7%)	61 (87.1%)	0.07
Proportion of women with recurrent miscarriage	3 (4.3%)	9 (12.9%)	0.07
Duration of the procedure (in seconds)	75.2 ± 10.9	73.3 ± 19.1	0.469
Pain during the procedure	54 ± 23.7	37.6 ± 27.6	<0.001
Pain immediately after the procedure	24.4 ± 14.4	13.3 ± 13.6	<0.001

* Data are presented as means and standard deviations and the indications of hysteroscopy are presented as frequencies and percentages.

Table 2: Baseline characteristics and pain scores in women with diagnosed intrauterine lesions and women without intrauterine lesions*

	Diagnosed IU lesion (n=53)	No IU lesion (n=87)	*P* value
Age	31.1 ± 5.8	28.9 ± 5.2	0.022
Gravidity	0.6 ± 1	0.6 ± 1.5	0.968
Body mass index	29.7 ± 3.9	28.7 ± 4.6	0.184
Proportion of women with infertility	47 (88.7%)	81 (93.1%)	0.535
Proportion of women with recurrent miscarriage	6 (11.3%)	6 (6.9%)	0.535
Proportion of women with blocked tubes	28 (52.8%)	42 (48.3)	0.601
Proportion of women with patent tubes	25 (47.2%)	45 (51.7%)	0.601
Duration of the procedure (seconds)	78 ± 13.7	72 ± 16.3	0.026
Pain during the procedure	47 ± 22.7	45.1 ± 29.3	0.678
Pain immediately after the procedure	18.9 ± 13.3	18.8 ± 16	0.966

* Data are presented as means and standard deviations and the indications of hysteroscopy are presented as frequencies and percentages.

Table 3: Baseline characteristics and pain scores in women with unilateral and bilateral tubal block*

	Unilateral tubal block (n=40)	Bilateral tubal block (n=30)	*P* value
Age	31.1 ± 6.3	30 ± 3.8	0.413
Gravidity	0.6 ± 0.7	0.6 ± 1.2	> 0.999
Body mass index	29.8 ± 4.4	28.7 ± 4	0.288
Proportion of women with infertility	38 (95%)	29 (96.7%)	> 0.999
Proportion of women with recurrent miscarriage	2 (5%)	1 (3.3%)	> 0.999
Duration of the procedure (seconds)	74.7 ± 10.7	75.8 ± 11.4	0.683
Pain during the procedure	52.3 ± 24.5	56.3 ± 22.8	0.494
Pain immediately after the procedure	23.6 ± 14.4	25.5 ± 14.6	0.596

* Data are presented as means and standard deviations and the indications of hysteroscopy are presented as frequencies and percentages.

Table 4: Baseline characteristics and pain scores in women with distal and proximal tubal block*

	Distal tubal block (n=13)	Proximal tubal block (n=57)	*P* value
Age	31.8 ± 4.8	30.4 ± 5.5	0.397
Gravidity	0.6 ± 1.1	0.6 ± 0.9	0.951
Body mass index	30.1 ± 4.6	29.5 ± 4.1	0.52
Proportion of women with infertility	13 (100%)	54 (94.7%)	0.621
Proportion of women with recurrent miscarriage	0 (0%)	3 (5.3%)	0.621
Duration of the procedure (in seconds)	73.6 ± 8	75.6 ± 11.5	0.557
Pain during the procedure	58.8 ± 22.7	52.9 ± 24	0.426
Pain immediately after the procedure	27.6 ± 17.6	23.6 ± 13.7	0.372

* Data are presented as means and standard deviations and the indications of hysteroscopy are presented as frequencies and percentages.

Table 5: Multivariate regression analysis (Dependent Variable: Pain during the procedure)

	Beta	Std. Error	*P* value	95 % CI
Age	1.054	.404	0.01	.26, 1.85
Gravidity	.644	1.622	0.692	-2.56, 3.85
BMI	.411	.502	0.415	-0.58, 1.40
Tubal patency	-14.435-	4.365	0.001	-23.0, -5.80
IU lesion by hysteroscopy	-1.443-	4.548	0.751	-10.44, 7.55

Table 6: Patient related factors contributing to pain experienced during outpatient hysteroscopy

	Study design	No of cases	Patient related factor studied	Association with pain
De Carvalho Schettini *et al*., 2007 (7)	PS	171	Menopausal state	Significant
			Absence of previous vaginal delivery	Significant
Cicinelli *et al*.,2007 (8)	PS	533	Anxiety	Significant
			Menopausal state	Significant
			Nulliparity	Non-significant
			Previous cesarean section	Significant
			Chronic pelvic pain	Significant
Fonseca *et al*., 2009 (28)	PS	167	Uterine retroversion	Non-significant
Sessa *et al*., 2012 (9)	PS	558	Previous cesarean section	Non-significant
Sessa *et al*., 2013 (29)	PS	291	Uterine retroversion	Non-significant
Török and Major, 2013 (10)	PS	70	Menopausal state	Non-significant
			Nulliparity	Non significant
Fonseca *et al*., 2014 (15)	PS	558	Severe dysmenorrhea	Significant
Mazzon *et al*., 2014 (30)	PS	255	Cervical synechiae	Significant
			Nulliparity	Significant
Zayed *et al*., 2015 (17)	PS	254	Menopausal state	Non-significant
			Menstrual phase	Non-significant
			Nulliparity	Significant
			Cervical pathology	Significant
			Uterine pathology	Non-significant
			Menopause	Non-significant
			Pelvic pain	Non-significant
Paulo *et al*., 2016 (11)	PS	104	Previous cervical surgery	Non-significant
			Previous cesarean section	Non-significant
			BMI	Significant

*PS=prospective study, BMI = body mass index

DISCUSSION

OH is increasingly used in outpatient setting as it is generally safe and well-tolerated procedure for most patients[13]. However, pain is a recognized limitation of the procedure and the most common cause of failure[1, 14]. In a prospective study on 558 patients undergoing OH, 32.3% of patients experienced severe pain[15].

Several factors can contribute to pain experienced during OH. These can be divided into factors related to the hysteroscopist, technique or procedure and patient characteristics. Hysteroscopist-related factors refer mainly to operator's experience which was found to affect the perception of pain during OH[15, 16]. The more experienced the hysteroscopist, the less the lateral movements and unnecessary rough manipulations which induces unacceptable pain. Also, with experience the time needed to complete the procedure is shortened. Some studies noted that the duration of hysteroscopy was significantly longer in patients who experienced severe pain[15, 17], although, this was not agreed upon by other studies that found no direct correlation between duration of the procedure and the severity of pain[7,18, 19]. In our study, impact of operator-related pain is nullified by performance of all procedures by the same hysteroscopist and there was no significant difference in duration between both groups.

Technique- or procedure-related factors have been the focus of many studies with the aim to improve the tolerability of the technique including; size and type of the hysteroscope (rigid versus flexible hysteroscopes), the type and pressure of the distension medium, the use of the vaginoscopic approach rather than the traditional approach. The use of thinner hysteroscope, normal saline as the distension medium and the use of vaginoscopic approach were identified as factors that improve success by minimizing pain[20]. Using 3.5 mm hysteroscopy system was found to be associated with significantly less pain as opposed to a 5mm diameter system without affecting quality of image[1, 21]. There may be a cutoff around 3.5mm below which reduction in size does not further reduce pain[22]. Although flexible hysteroscopes were found to be less painful than rigid ones, the latter is more commonly used due to low failure rates, better image quality, shorter time to perform the procedure and more cost-effectiveness[23]. Saline "as distension medium" was compared to CO2revealing no significant difference in pain was noted[24] however, the use of saline is preferred as associated with less vasovagal episodes[25]. The optimum distension pressure is the one that allows proper inspection of the whole uterine cavity without causing over distension of the uterus which causes pain[4]. Studies reported that the minimum pressure required to distend the uterine cavity was 40 mmHg[26] while that required for spillage of hydrotubation fluid from tubes was 70 mmHg[27]. In this study, we used a uterine filling pressure of 80- 100 mmHg allowing studying the impact of tubal blockage on pain experienced during the procedure.

We believe that the occurrence of pain despite refinement of the technique could partly be attributed to the overlooking of patient related factors which have not been comprehensively studied in literature. Table 6 demonstrates studied patient-related factors. Identifying patients who are more likely to experience pain may help to develop strategies for these particular patients to improve their satisfaction "e.g. the selective administration of analgesics or using lower uterine filling pressure".

Patient-related factors that may contribute to pain experienced during OH and which have been studied include; anxiety, menopausal status, parity, previous caesarean delivery, uterine retroversion, cervical synechiae, chronic pelvic pain, dysmenorrhea and BMI. Table 6 shows a summary of previous studies evaluated the impact of different patient related factors on pain experienced during OH.

To the best of our knowledge, this is the first trial to evaluate the impact of tubal blockage on pain experienced during OH. In our study, we used strict inclusion criteria to ensure eliminating the effect of confounding variables which can affect the results and cause bias. Also, all procedures were conducted by the same hysteroscopist using the same technique of vaginoscopic approach and same hysteroscopy set up.

In our research, when the filling pressure was 80-100 mmHg, patients with blocked tubes experienced significantly more pain during and immediately after the procedure than those with patent tubes. This was irrespective to either the laterality of the tubal block (unilateral vs. bilateral) or to the site of the tubal block (distal vs proximal). Likewise, patients with blocked tubes experienced more pain during HSG[31] and during hysterosalpingo-contrast sonography[32]. Although these techniques differ than hysteroscopy, they all aim to distend the uterine cavity by instillation of fluid.

In patients with distal block, the pain could possibly result from distention of the blocked tube[32]. However, it is difficult to explain why patients with proximal tubal block had more pain. A possible explanation may be that proximal tubal block could have resulted in rapid rise of intrauterine pressure which possibly induced more cramping uterine pains.

Limitations of this study include the fact that all results were based on the subjective perception of pain which varies among individuals and influenced by previous pain experience. Another limitation is that we relied on HSG for the assessment of tubal patency.

Despite having a fair sensitivity and specificity in the diagnosis of tubal patency and tubal blockage, laparoscopy is considered the gold standard[33]. Nevertheless, HSG is a less invasive test and more readily available as a basic investigation for the evaluation of tubal patency. Hence, we believe that the mere presence of an evidence of tubal blockage on HSG is sufficient to consider applying strategies that may improve patient's satisfaction "e.g. shortening duration of the procedure, care to use lower filling pressures and /or using pre-emptive analgesics

CONCLUSION

Blocked Fallopian tubes contribute to pain experienced during and immediately after OH when a uterine filling pressure of 80 -100 mmHg is used. However, this didn't adversely affect the success rate of the procedure.

CONFLICT OF INTEREST

There are no conflicts of interest.

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