

# A Multicenter Study Analyzing the different Indications of Hysteroscopy in General Population and the Complication Rate: An Experience of 11 Years

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## ABSTRACT

**Study objectives:** An assessment of the common indications for hysteroscopy (either diagnostic or therapeutic), in multiple hospitals especially in the North Indian region, over the period of past 11 years.

To do an analysis of the common intraoperative diagnosis and the different types of surgeries performed therefore.

To estimate the incidence of complications in the same patient population over the same time period and describe their nature.

**Data collection:** Records were collected from twelve hospitals spread mainly over North Indian region, pertaining to all those patients who underwent hysteroscopy during the period from July 2003 to October 2014. Total cases analyzed was 1834.

**Design:** Retrospective analytic study.

**Patients:** All those patients who underwent hysteroscopy of all ages referring to the above mentioned hospitals during the period from July 2003 to October 2014.

**Results:** Of the 1834 hysteroscopic procedures, 588 (32.06%) were diagnostic hysteroscopies and 1246 (67.93%) were therapeutic hysteroscopies. The most common indication for hysteroscopy was abnormal uterine bleeding (28.14%) closely followed by the second most common indication, which was for infertility check-up (26.67%). The most common hysteroscopic intervention was endometrial biopsy. The second most common intervention and the most common therapeutic hysteroscopic procedure was polypectomy; and the third most common Hysteroscopic procedure was intrauterine adhesiolysis. The main complication as found in our present study was found to be uterine perforation (0.21%), followed by false passage. Air embolism also occurred in one patient.

**Keywords:** Hysteroscopy, Indications, Complications, Perforation, Air embolism.

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**Conflict of interest:** None

## INTRODUCTION

The use of minimally invasive techniques, such as hysteroscopy, has increased with time. Since, the 1970s, hysteroscopy has begun to increasingly attract the attention of surgeons as a diagnostic and therapeutic alternative due to its greater accuracy in diagnosis and treatment, reduced morbidity, and reduced healthcare costs. New instruments and techniques continue to emerge, and the prospects for improvement seem unlimited.

In this study, we present a review of hysteroscopic procedures performed in multiple centers spread over the North Indian zone, over a period of 11 years, from July 2003 to October 2014, particularly highlighting the different indications for which the general population is undergoing hysteroscopy as well as the complication rate associated with the procedure over the same time period.

## OBJECTIVE

**The aim of this study was:**

1. An assessment of the common indications for which the general public has reported and opted for hysteroscopic management (either diagnostic or therapeutic), in multiple hospitals especially in the North Indian region, over the period of past 11 years.
2. To do an analysis of the common intraoperative diagnosis and the different types of surgeries performed.
3. To estimate the incidence of complications in the same patient population over the same time period and describe their nature.

## MATERIALS AND METHODS

**Data collection:** Records were collected from twelve hospitals spread mainly over North Indian region, pertaining to all those patients who underwent hysteroscopy—(diagnostic or therapeutic) during the period from July 2003 to September 2014. Only those cases were included

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in our study for whom the detailed documents required were available. So, the total cases analyzed in our study amounted to be 1834.

*Design:* Retrospective analytic study.

*Patient(s):* All those patients who underwent hysteroscopy—(diagnostic or therapeutic) during the period from July 2003 to September 2014 were analyzed retrospectively. Our study included patients of all ages referring to the above mentioned hospitals.

A complication was defined as an unexpected event during hysteroscopy that required further treatment in the form of any intraoperative or postoperative intervention<sup>1</sup> (e.g. any event that required stopping or interruption of the procedure; or deteriorating health of patient, or needing further laparoscopy or laparotomy).

## RESULTS

Over the 11-year period from July 2003 to October 2014, among all the hysteroscopies performed in twelve different centers, we have analyzed the recorded data of 1834 hysteroscopic procedures, which were documented with all the required details. Of the 1834 hysteroscopic procedures, 588 (32.06%) were diagnostic hysteroscopies and 1246 (67.93%) were operative hysteroscopies.

The most common indication for hysteroscopy was abnormal uterine bleeding (28.14%) (Table 1) closely followed by the second most common indication, which was for infertility check-up (26.67%).

The most common intraoperative diagnoses were hyperplastic endometrium, uterine polyps and intrauterine adhesions. In 32.6% of all cases, diagnostic hysteroscopy was not proceeded with any further intervention and no obvious pathology was detected.

**Table 1:** The common indications for which patients had reported and/or had undergone Hysteroscopic procedures over the past 11 years, as analyzed retrospectively in our study

Indications	No. of patients (n = 1834)	Percentage
Abnormal uterine bleeding	516	28.14
Postmenopausal bleeding	35	1.90
Infertility (primary and/or secondary) (includes diagnosed/nondiagnosed cases of Ashermans/septum/PCOD/endometriosis)	489	26.67
Incomplete abortion	18	0.98
Misplaced/embedded IUCD	16	0.87
Dysmenorrhea, chronic pelvic pain	373	20.33
Others (includes asymptomatic patients with some ultrasound diagnosed pathology)	339	18.48
Second look hysteroscopies after adhesiolysis/septum resection	48	2.61

Among all the procedures performed, the most common hysteroscopic intervention was endometrial biopsy (Table 2). In cases of patients with complain of abnormal vaginal bleeding, diagnostic hysteroscopy was performed in all ages—reproductive, premenopausal, or postmenopausal. In the presence of any pathologic lesion and/or when indicated, biopsy was taken and sent for histopathology. In cases of infertile patients TB-PCR was also sent.

The second most common intervention and the most common therapeutic hysteroscopic procedure was polypectomy.

The third most common hysteroscopic procedure was intrauterine adhesiolysis; and more than 50% of such adhesions were diagnosed only intraoperatively.

In 6% of cases, hysteroscopy was combined with diagnostic laparoscopy. In more than 90% of such cases, the indication was infertility check-up. In rest of the cases, there were other reasons for laparoscopy, e.g. chronic pain abdomen, suspected uterine malformations, suspected adnexal mass, etc.

In 21.74% of cases hysteroscopy was combined with operative laparoscopy. In 39% of such cases laparoscopy was done for PCOD drilling. So, among all our cases, hysteroscopy along with laparoscopic PCOD drilling was done in about 10.86% of total patients. In 19.2% of cases, it was for endometriosis and in 11.9% of cases, it was for ovarian/para-ovarian/para-tubal mass resection.

In the past 11 years, our analysis (Table 3) has shown a gradual rising trend of operative hysteroscopic proce-

**Table 2:** Quantitative analysis of all the major operative hysteroscopic procedures

Types of procedure	No. of patients	Percentage	
		Out of total hysteroscopies (n = 1834)	Out of all operative hysteroscopies (n = 1246)
<b>Endometrial biopsy</b>			
• For AUB	245	13.36	19.66
• Postmenopausal	35	1.91	2.81
• For Infertility	69	3.76	5.53
Intrauterine adhesiolysis	179	9.7	14.36
Septal resection	52	2.83	4.17
Polypectomy	201	10.95	16.13
Myoma resection	53	2.88	4.25
Hysteroscopic adenomyomectomy	5	0.27	0.40
Tubal cannulation	21	1.15	1.68
RPOC and bone pieces removal	18	0.98	1.44
Thermal ablation	1	0.05	0.08
IUD removal (Misplaced/embedded)	16	0.87	1.28

dures, as compared to the earlier use of hysteroscopy for diagnostic purposes mainly. Incidence of myomectomy and septal resection has dramatically increased. Also, intrauterine adhesiolysis rate has seen a considerable rise. In 2003, it was only 1.5% (1 case out of total 65 cases) whereas in 2014, 41 total intrauterine adhesiolysis was done out of 214 patients (20%).

In 2003, only 1 myomectomy was done out of 65 total patients (1.5%), was done whereas in 2013, the rate was 3.8% and in 2014 it was 2.4% in 2014.

In 2003, no case of septoplasty was recorded; in 2004 only 1 case of septoplasty was done out of 149 patients (0.67%); whereas in 2014, 11 cases of septoplasty was done out of 204 patients (5.39%).

Regarding complications, acute complications occurred in 6 (0.33%) out of 1834 patients who underwent hysteroscopy. No case of fluid overload was noted. No postoperative complication and no late complications were reported. The main complication as found in our present study was found to be uterine perforation (0.21%), followed by false passage (0.05%), which is similar to that reported by other authors.<sup>1,2</sup> Few literature, however, report fluid overload as the most common complication,<sup>3,4</sup> although our analyses of 11 years' document did not show any such complication (Table 4).

## DISCUSSION

Hysteroscopy is a minimally invasive procedure, the use of which has increased over time due to its various advantages. The most important benefit of hysteroscopy is its 'see and treat' potential, which not only avoids many unnecessary surgical interventions, but it also cuts the cost of unnecessary investigations and reduces the number of hospital visits, and most importantly, it provides higher patient as well as surgeon's satisfaction.

Our present paper analyses a series of hysteroscopies carried out from July 2003 to October 2014 in 10 different

hospitals of North India. Emphasis is laid on the description of the indications for which the different surgeries were performed and on the complication that happened intraoperatively or postoperatively.

In the present study, the most common indication for performing this procedure was a complaint of abnormal uterine bleeding. This goes parallel with the view opined by other literature as well.<sup>2,5,6</sup> The second most common indication was infertility. Hysteroscopic examination with endometrial biopsy is currently the most informative investigation for patients with abnormal uterine bleeding and infertility.

The development of hysteroscopy came relatively late compared with other endoscopic procedures, possibly because of particular difficulties peculiar to the uterus, including narrowness of the uterine cervix, fragility of the endometrium, and the practical problem of ensuring thorough cleansing of the uterine cavity by a distending medium to allow clear viewing.<sup>1</sup>

A complication was defined as an unexpected event during hysteroscopy that required further treatment in the form of any intraoperative or postoperative intervention<sup>1</sup> (e.g. stopping procedures because of excessive fluid overload, deteriorating health of patient, or further laparoscopy or laparotomy). Complications can be of three types: approach (entry-related), technique-related (caused by surgical instruments) and anesthesia related complications.

The complications in our analyses have been reported only with operative (therapeutic) hysteroscopy. None of the diagnostic hysteroscopies were met with any complication. Operative hysteroscopy requires more time and fluid distension along with instrumentation and the need for cervical dilatation (while doing hysteroscopic myomectomy or endometrial resection); thus increasing the risk of uterine injury, perforation, fluid overload, pulmonary edema and other complications.

**Table 3:** Year wise quantitative analysis of hysteroscopic procedures

Years	Total hysteroscopies			Comparison of major operative hysteroscopies				
	Diagnostic hysteroscopies	Operative hysteroscopies	Total hysteroscopies	Endometrial biopsy	Polypectomy	Adhesiolysis	Myomectomy	Septal resection
2003	22	43	65	16	7	1	1	0
2004	72	77	149	32	15	7	4	1
2005	48	72	121	21	11	8	1	1
2006	49	77	126	19	16	7	0	0
2007	70	89	159	33	26	15	6	2
2008	58	86	154	18	25	14	6	5
2009	72	92	164	29	19	12	5	6
2010	67	101	168	26	19	14	6	5
2011	68	103	171	27	17	20	7	6
2012	78	92	170	24	15	19	5	7
2013	73	101	184	31	14	21	7	8
2014	74	140	204	41	17	41	5	11

**Table 4:** Complications during hysteroscopic procedures

Complications	No. of complications (%)	Total hysteroscopies: (n = 1834) Operative procedures (n = 1246)	
		Percentage of complications among total number of hysteroscopies (n = 1834)	Percentage of complications among only operative hysteroscopies (n = 1246)
Total	6	0.33	0.48
False passage	1	0.05	0.08
Fluid overload	0	0	0
Perforation	4	0.21	0.32
• Dilatation	1	—	—
• Instrumental	3	—	—
Air embolism	1	0.05	0.08

**Table 5:** Reported complications of operative hysteroscopic procedures in multiple studies: a comparison

Reported complications of operative hysteroscopic procedures					
Years	Authors	n	Perforation (%)	Bleeding (%)	Fluid overload (%)
1991	Magos et al	234	2.0	0.4	3.0
1992	Hill et al	850	0.8	0.8	0
1994	Pinion et al	105	1.0	6.0	11.0
1995	Scottish hysteroscopy audit group	978	1.1	3.6	6.0
1996	O'Connor & Magos	525	2.0	0.6	4.0
1997	O'Connor et al	116	3.0	0	3.0
1997	Nicoloso et al	2,757	1.5	0.11	0.11
2000	FW Jansen et al	13,600	1.3	0.16	0.2
2000	Anthony M Propst et al <sup>4</sup>	925	0.43	—	0.75
2002	B Aydeniz et al <sup>7</sup>	21,676	0.12	—	0.06
2009	Olav Istre et al <sup>3</sup>	800	1	3	5.2
2014	MEC study (present study)	1834	0.22	0	0

The main acute complication as found in our present study was found to be uterine perforation (0.21%), followed by false passage (0.05%), which is similar to that reported by other authors.<sup>1,6</sup> Some literature, however, report fluid overload as the most common complication,<sup>3,4</sup> although our analyses of 11 years' document did not show any such complication. Adhesiolysis and septal resection had the highest complication rate (4.5%) followed by polypectomy.

The first six quoted studies were prospective, and complications occurred only during endometrial ablations. The last four studies represent all types of operative hysteroscopies.

From the Table 5, the most frequently reported non-fatal complication of hysteroscopy is found to be uterine perforation as documented by almost all the authors.

The total number of cases with complications is appearing high in recent studies, but this is because of much higher study population and also apparently because of increased number of total hysteroscopic surgeries being performed recently.

In the study done by the author FW Jansen,<sup>1</sup> (by far the largest prospective multicenter study of hysteroscopic complications), the study population was 13,600 and 82

gynecological centers in Netherlands were included. The total complication rate was 0.28% and out of all operative procedures, it was 0.95%. In the most recent literature of 2009, by author Olav Istre,<sup>3</sup> a series of 800 women undergoing endometrial ablation in 54 hospitals were analyzed and the total complication rate was 3.9%. Fluid overload of 1 to 2 l occurred in approximately 5.2% and > 2 L in 1% of cases. Death due to septicemia or fluid overload has been reported in this article in 0.1% of cases. In the study done by B Aydeniz et al,<sup>7</sup> 21,676 hysteroscopic procedures throughout Germany was analyzed retrospectively. In 0.22% of the cases, they found complications, which seem much lower; though according to the author, this may be due to the higher proportion of documented procedures performed by the more experienced centers only, leading to underreporting of total number of complications.

Among all the hysteroscopic procedures, septal resection had the highest complication rate in our study (2 complications out of 52 cases), i.e. 3.8%. Whereas the next most common procedure associated with complication was adhesiolysis (3 complications out of 179 cases of adhesiolysis), i.e. 1.67%. This also goes parallel with other literatures.<sup>1,8</sup> In the study done by the author FW Jansen,<sup>1</sup> incidences of complications with intrauterine adhesiolysis



was 4.48%, with endometrium resection it was 0.81%, with myomectomy it was 0.75%, and with removal of a polyp it was 0.38%.

Correlating our data with that reported in other studies, we find hysteroscopy to be a safe and effective minimally invasive procedure with a low rate of complications. Surgeon's expertise is of prime importance in making the correct diagnosis after viewing the uterine cavity, and thus to minimize the number of interventions as well as to avoid the unexpected complications. In our present study, all the patients included for analyses had undergone surgery from senior and quite experienced surgeon. This may be one of the reasons for the comparatively lower rate of complication as seen in our study.

However, even with the use of the latest modernized technique by an experienced endoscopic surgeon, use of a HD camera and in the presence of modernized OR, complication did occur as documented in our analyzes, even though very rarely. Even after taking all the apparent precautionary measures, a small percentage (0.33% risk) ended in undesirable events in the 11 years period of our study, and even death was reported in one case (0.05% risk). So, we conclude that bringing down the complication rate to nil is almost impossible, although we should endeavor to minimize the complication rate.

Prevention of hysteroscopy complications starts by raising awareness of risks and precautions.

In our study, all the perforations have been reported to have occurred during instrumentation by scissors and none by resectoscope which is in contrast to other literatures.<sup>10</sup> As discussed in a retrospective study done by Sangchai Preutthipan et al in 2005, higher rate of complication when using resectoscope was due to the bigger size of the polyps in a resectoscopic group and the need of dilating the cervix for introducing the larger diameter of a resectoscope; and in most of these cases reported, perforation was caused during dilatation. However, no comparison of relative safety can be done based on our contrary observation because the sample size of patients with complication is too small to comment. In all our cases, as a general safety measure while using resectoscope, the loop was always used in a way that it moves toward the operator, and not pushed into the uterus. Furthermore, much attention was paid regarding activating the power which should be activated only when the surgeon has a clear view of the loop or needle.

In our study, only one case had perforation while doing cervical dilatation. In previous literature, the rate of perforation while dilatation has been as high as 30.33% in one study<sup>1</sup> and more than 50% in another study.<sup>11</sup> The increasing use of office hysteroscope (Bettocchi Office Hysteroscope 5 mm) has obviously decreased the risk of

uterine perforation associated with dilation of the cervix as it does not require cervical dilatation.

Though the risk rate is very low, but still the surgeon must counsel and make the patients aware of the potential risks for uterine rupture during future pregnancies for patients undergoing hysteroscopic metroplasty or complicated operative hysteroscopy.<sup>9</sup>

In our 11 years study, fluid overload was never met with. This may be because of use of normal saline in almost all the cases (Glycine 1.5% was used only rarely when monopolar resectoscope was used); as well as very careful monitoring of the inflow pressure applied.

Also, none of our patients was ever complicated with postoperative infection. However, risk for endometritis ranges between 0.92 and 2.7% in the literature.<sup>12</sup> In a 10 years study done by the author Aubert Agostini<sup>12</sup> in 2002, including 1952 patients, the global infectious complication rate after operative hysteroscopy was reported as 1.42% and the risk for early onset endometritis was found to be highest after lysis of synechiae.

Venous air and gas embolism is a potential serious complication<sup>13</sup> that can occur rarely and has actually occurred in one of our patient. These are rare but hazardous complications, which can occur actually in any type of surgical procedure. In hysteroscopic surgery, large uterine veins may be exposed and are, therefore, a point of entry for gas or air. A number of fatal and nonfatal cases have been described as case reports previously.<sup>13-17</sup> Although awareness for air and gas embolism is raised this way, proper guidelines as to how to reduce the risk of venous gas or air embolism are lacking.

Factors concerning the surgeon which can lead to air embolism include extensive cervical dilatation that may cause a cervical laceration,<sup>14</sup> producing a conduit for air entry. Forced irrigation of tiny air bubbles may sometimes cause entry into the circulatory system. Also, some case reports have been published<sup>13-15</sup> where reintroduction of the hysteroscope, facilitating air entry into the vascular compartment has been held responsible for air embolism. Another very important cause of air embolism is air bubbles entering the tubing of the irrigant solution during the replacement of bags, or by the formation of gas bubbles during laser vaporization and resectoscope electrocoagulation. In patients with a patent foramen ovale<sup>15,16</sup> or a ventricular septal defect, when the right ventricular outflow is occluded with gas bubbles, right heart pressure can increase. Elevated right heart pressure can force gas bubbles to the left chambers of the heart leading to significant neurologic complications.

In our case, however, no cervical dilatation was used and there was no reintroduction of the hysteroscope and no gas bubbles in the hysteroscope system. So, in

our patient, the exact etiology of the gas embolus was unknown.

Following hysteroscopy, pulmonary edema can be a complication most commonly caused as a result of fluid overload.<sup>18</sup> and also occasionally as a consequence of air embolism. It may also be attributed to acute airway obstruction and intravascular absorption of glycine. Patients with left ventricular or left arterial dysfunction may develop cardiogenic pulmonary edema even with moderate fluid overload. None of our patient However, did have any postoperative airway obstruction or any fluid or glycine overload as estimated by the surgical and anesthetist team present there.

A favorable outcome depends on early diagnosis and prompt treatment which can greatly improve prognosis for this complication which is otherwise almost invariably fatal. During hysteroscopy, a precipitous drop in PaCO<sub>2</sub>, a sudden decline in SpO<sub>2</sub>, a decrease in BP, and a significant reduction in HR along with cardiac arrhythmia are warning signs of gas embolism.<sup>14</sup> As soon as air embolism is suspected, urgent intervention using immediate pericardial thumps and cardiac massage should be performed; the surgical procedure should be terminated, and the vagina packed with a sponge to prevent further air entry.

In summary, as a measure of safe practice, the anesthesiologist and surgeon should take the following perioperative steps to minimize a potential life threatening events.<sup>13,19</sup> (1) optimum use of office hysteroscope to avoid cervical dilatation; (2) use an air-free hysteroscopic system (3) prevent air entry into the intravascular compartment via the dilated and lacerated cervix; (4) carefully monitor PaCO<sub>2</sub>, and (5) avoid steep Trendelenburg position<sup>13</sup> (6) proper training of the aspiring hysteroscopic surgeon and the whole operating team.

The recognition of complications and prompt intervention helps in preventing adverse sequel as well as in minimising undesirable patient outcomes and reducing legal risks.

## CONCLUSION

The indications for therapeutic hysteroscopy are increasing and its proper applications can improve patient's gynecologic care including lower costs, shorter hospital stays, and shorter recovery time. New instruments and techniques continue to emerge, and the prospects for improvement seem unlimited. Hysteroscopic procedures, particularly myomectomy and endometrial resection, are effective alternatives to hysterectomies. Our study showed that hysteroscopy carries small risks that cannot

be eliminated completely. Although hysteroscopy is an important diagnostic tool in gynecology, a small percentage (0.33% risk) ends in undesirable events and in the 11 years period of our study, even death was reported in one case (0.05% risk). Prevention of hysteroscopy complications starts by raising awareness of risks and taking adequate precautions.

These facts should stimulate the gynecologist to become proficient with hysteroscopy for diagnosis and the treatment of many intrauterine abnormalities. Proper training is imperative and there is a learning curve that must be respected and followed for all procedures.

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