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A Novel Approach of Intralesional Vasopressin using an Ovum Pick up Needle in Hysteroscopic Myomectomy

Vidya V Bhat[1]*, Alka Kumar[1], Gauthami M[1], Vibha Bhat[2] and Leela Sravanthi Veeradhi[2]

[1]Obestetrics and Gynecology, Radhakrishna Multi-speciality Hospital and IVF Centre, Bangalore, India

[2]MBBS, Radhakrishna Multi-speciality Hospital and IVF Centre, Bangalore, India

ABSTRACT

The aim was to evaluate the efficacy of vasopressin injected into the center of submucosal myomas using an ovum pick up needle during hysteroscopic myomectomy.

Design: Canadian task force II-2 clinical study

Setting: Urban clinical research center,38 patients were enrolled in the study

Materials and Methods: A retrospective Canadian Task Force II-2 clinical study design conducted on women aged 22-55 years in an urban clinical research center. 38 symptomatic patients underwent hysteroscopic myomectomy after injection of dilute vasopressin (10U in 100mL Normal Saline). Around 5-8 mL was injected into the center of myomas using an ovum pick up needle, and the study was carried out between 2018-2021. Measured parameters were surgical operative time, and the secondary outcomes were related to fluid volume, visual clarity, and pregnancy outcome in patients with infertility.

Results: The Wamsteker Grading System adopted by the European Society for Gynecological Endoscopy was used to classify the myomas. The mean time of myomectomy was 22 minutes (normal range: 15-40 minutes), with a median fluid deficit of 700 mL (normal range: 500- 900mL); one patient had more than 1000 mL fluid deficit which was detected immediately and managed efficiently. This patient had the longest surgical operative time of 40 minutes with 10 multiple myomas between 1 and 4 cm in size.

The diagnosis of the size, number, and grade of submucosal myomas was made by transvaginal ultrasound. In our study it was observed that the use of vasopressin injection during hysteroscopic myomectomy resulted in significantly reduced surgical operative time, minimal fluid **deficit, lesser** bleeding with a clear surgical field, and improved pregnancy outcome in infertility patients.

Conclusion: Injection of vasopressin during hysteroscopic myomectomy was found to be effective in decreasing surgical operative time, improvement of visual clarity, thereby improving pregnancy outcomes in patients presenting with infertility.

***Corresponding author**

Vidya V Bhat, 1Obestetrics and Gynecology, Radhakrishna Multi-speciality Hospital and IVF Centre, Bangalore, India.

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Introduction

Submucosal leiomyomas (LMs) represent 5.5–10% of all uterine LMs which have a prevalence as high as 70–80 % at the age of 50 [1]. It is the most common type of benign tumour in the female reproductive system, composed of smooth muscle with variable amounts of connective tissue. These submucosal myomas can lead to symptoms such as abnormal uterine bleeding, infertility, preterm labour, and abdominal pain [2].

The first hysteroscopic myomectomy was performed by William Norment in 1957, using a cutting handle. In 1976, Neuwirth and Amin did a transcervical approach to the excision of fibroids by a combination of electrocautery and forceps. Subsequently, the technique was modified by using a urologic resectoscope, monopolar current and 32% Dextran 70 (Hyskon) as the distension medium in 1978 [3].

In 1987, Hallez reported on the development of a gynecologic resectoscope, changing the urologic instrument into a continuous-flow device; cutting current was used, but with 1.5% glycine as the distension medium [4].

Over the last 20 years, many improvements have been made in instruments and techniques. Hysteroscopic myomectomy has become the 'surgical technique' and, at present, it represents the standard minimally invasive surgical procedure for treating uterine leiomyomas entirely or mostly located within the uterine cavity, and also has shown improvement in fertility rates and reducing the risk of menorrhagia and has yielded high patient satisfaction [5,6].

The surgical challenge is the complete resection of the myoma in one session without causing further complications or relapsing symptoms. The chance of complete removal depends on many variables such as the location, type, and size of the myoma. The volume deficit is another challenge in the complete resection of myomas. The open vessels of myoma mostly absorb the fluid during myomectomy [7,8].

The success of hysteroscopic myomectomy relies on adequate visualization during the procedure by sufficient distending pressure and satisfactory control of blood loss. The risks of hysteroscopic myomectomy include bleeding, infection, cervical trauma, uterine perforation, and fluid overload, which can be potentially life-threatening if complicated by pulmonary edema, hyponatremia, heart failure, and cerebral edema [9,10].

Vasopressin is a natural hormone that is secreted by the posterior lobe of the pituitary gland. Due to the vasoconstrictive effect of vasopressin on tissues, it has been used during abdominal and laparoscopic myomectomies. However, studies on the use of vasopressin in hysteroscopic myomectomy are limited. Two trials investigated intracervical injection of vasopressin during operative hysteroscopy and showed a reduction in fluid intravasation and blood loss [11,12].

Some studies showed that intracervical administration of vasopressin reduces blood loss and the absorption of low-viscosity distension fluid due to its vasoconstrictive effect [13].

Vascular myomas can limit visualization when the resectoscope is being used. Intralesional injection of dilute vasopressin has been shown to reduce blood loss during surgery and give better clarity in the surgical field. There are reports of terminating hysteroscopic myomectomies before complete resection due to impaired vision and maximum fluid overload [14].

The management of blood loss during surgery after vasopressin injection reduces the operative time and improves visual clarity. The aim of the present study was to assess the effect of vasopressin injected, in reducing the surgical operative time, fluid deficit, visual clarity, and completion of surgery without any complication and improving pregnancy outcomes in patients with infertility [15].

Materials and methods: This study was conducted at a single urban research center between 2018-2021 on 38 symptomatic women aged 22-55 years, who underwent hysteroscopic myomectomy after injection of dilute vasopressin into the myomas, after obtaining written and informed consent explaining the procedure and the risks associated with it.

A detailed history, abdominal and vaginal examination was done; diagnosis and mapping and determining the size of myomas were done by transvaginal ultrasound. The WAMSTEKER grading system adopted by the European Society of Obstetrics and Gynecology endoscopy was used to grade the myomas. All these women underwent a pre- anaesthetic evaluation before the procedure [16].

Exclusion Criteria

Women with cardiovascular, and renal conditions; asthma, migraine, heart failure, epilepsy, endometrial pre-malignant or malignant pathologies, menopausal, and use of preoperative GnRH [17].

10U of vasopressin was diluted in 100 mL of NS. 10 mL of dilute solution was collected in a syringe. This was connected to a 35cm long,17-gauge single-lumen ovum pick up needle and then inserted into a 5F hysteroscopic instrument channel to be injected into the center of myomas under direct vision. The time taken for injection of vasopressin into the myomas was less than 3 minutes. After injection, this instrument channel was changed to a ,26F monopolar resectoscope equipped with a loop electrode which was then used for myomectomy. The electrosurgical unit was set at 60-80 W cutting energy in blend mode. The fibroid was resected using the standard slicing technique.

Glycine (3%) was used as distending medium. The inflow pressure was maintained by gravity, and the fluid bags were kept at a height of 90–100 cm.

The inflow and outflow volumes of the distension solution were carefully monitored and the fluid deficit was recorded at 5-minute intervals by nurses in the operating theater. Good visual clarity was noted by the surgeon. The VAS (Visual Analogue Score) was given to be V0-V5, as contextualized by the below table. The complete resection of myomas, the surgical operative time taken, and the intraoperative and postoperative complications were recorded by the nursing staff.

Table 1

VAS (VISUAL ANALOGUE SCORE)	INTERPRETATION
V0	red flag sign, no visualisation of anatomical landmarks like tubal ostias, myomas
V1	red translucent fluid, no visualisation of anatomical landmarks
V2	intermittent visualisation of myomas and anatomical landmarks
V3	bloody haziness, no clear visualisation of myomas and anatomical landmarks
V4	hazy visualisation of myomas and anatomical landmarks
V5	good visualisation of myomas and anatomical landmarks

Results

This study was pre-approved by Radhakrishna Hospital Ethics Committee. All 38 symptomatic patients willingly participated in the study with informed consent. All patients were aged between 22-55 years. The mean age was 35, and seven patients had primary infertility, one patient had secondary infertility, and all 8 patients of infertility conceived spontaneously. One patient had a spontaneous abortion at 10 weeks, one patient had a pre-term vaginal delivery at 35 weeks,3 patients had a full-term vaginal delivery, and 3 patients had lower segment cesarean section at term for fetal distress.

30 patients had abnormal uterine bleeding as the main complaint. 10 patients had single submucous myomas, and 20 patients

had multiple myomas ranging between 1 to 4cms, varying in number from 2 to 10 myomas. The time required for vasopressin injection was less than 3 minutes in all cases. The time required for myomectomy ranged from 15 to 40 minutes, and the patient with the longest operative time had 10 multiple submucous myomas of varying sizes, including a large G2 myoma of 4 cm at the fundus. The range of fluid deficit was 500 to 900 mL, with the median being 700 mL. One patient had a deficit of 1000 mL which was detected immediately and managed. All cases had complete excision of submucous myomas in a single setting without any complications, with good visual clarity (VAS V4 - V5).

Subsequently, all 38 patients were called for a follow-up after 9 months. It was observed that 7 primary infertility patients and 1 secondary infertility patient conceived spontaneously within 9 months of the procedure, 30 patients were symptom-free, and no myomas were observed on transvaginal ultrasound.

Table 2: Patient Characteristics

AGE	CHIEF COMPLAINTS	NUMBER OF PATIENTS (TOTAL: 38)	PARITY	MEDICAL HISTORY
22-34 years	PRIMARY INFERTILITY	7	NULLIGRAVIDA	NONE
30 years	SECONDARY INFERTILITY	1	PRIMIPAROUS	NONE
35-55 years	HEAVY MENSTRUAL BLEEDING	30	MULTIPAROUS	NONE

Table 3: Pregnancy Outcome in Infertility Patients

AGE	CHIEF COMPLAINT	PREGNANCY OUTCOME	NUMBER OF FIBROIDS, GRADE, SIZE
34	PRIMARY INFERTILITY	SPONTANEOU S ABORTION AT 7 weeks	4; 2 x 2 cm,1 x 1 cm,1.5 x 1.5 cm, 2 x 2 cms, Grade 0-1
28	PRIMARY INFERTILITY	FTND AT 38 weeks	3; 2 x 2 cm, 3 x 2 cm, 1 x 1 cm Grade 0-1
34	PRIMARY INFERTILITY	FTND AT TERM	2; 3 x 3 cm, 2 x 2 cm Grade 1
30	PRIMARY INFERTILITY	FTND AT TERM	1; 4 x 3 cm Grade 0-1
30	SECONDARY INFERTILITY	LSCS AT TERM	3, 2 2 x 2 cms, Grade 0-1
27	PRIMARY INFERTILITY	PRETERM DELIVERY AT 36 weeks	1; 3 x 3 cm, Grade 0-1
27	PRIMARY INFERTILITY	LSCS AT TERM	4; 2 x 2 cm, 3 x 2 cm, 3 x 1 cm, 2 x 2 cms Grade 0-1
30	PRIMARY INFERTILITY	LSCS AT TERM	3; 2 x 2 cm, 3 x 2 cm, 3 x 1 cm, Grade 0-1

Table 4: Operative Characteristics

NUMBER OF MYOMAS	SIZE OF MYOMAS	GRADE OF MYOMAS	VAS SCORE (0- 5)	POSTOPERATIVE COMPLICATIONS
1	2 x 3 cm	Grade 1	5	none
1	3 x 4 cm	Grade1	4	None
1	4 x 4 cm	Grade1	4	none
3	1.3 x 1.8 cm, 1.5 x 1.5 cm, 1.8 x 2 cm	Grade 0-1	4	none
3	2 x 2 cm, 1.5 x 2 cm, 2 x 2 cm	Grade 1	4	none
1	3 x 3.5 cm	Grade 1	5	none
5	4 seedling fibroids, 2x2 cm	Grade 0	3	none
2	3 x 2 cm, 3 x 3 cm	Grade 1	5	none
6	4 seedling fibroids, 1.7 x 1.8 cm, 2 x 1.6 cm	Grade 0-1	4	none
4	1 x 1.2 cm, 1.2 x 1.5 cm, 2 x 1.8 cm, 1 x 1 cm	Grade 0-1	5	none
3	1.2 x 1 cm, 2 x 1.5 cm, 1x1 cm	Grade 0-1	4	none
8	5 seedling fibroids, 1.7x1.5 cm, 1.5x1 cm, 1x1 cm	Grade 0-1	4	none
4	2x2,2x1,2x2,1x1	Grade 1	4	none
3	1.7x1.5 5, 1.5 x1.5,1x1 cm	Grade 0-1	4	none
2	2x2,2x2	Grade 1	4	none
1	4x3	Grade 1	4	
10	1x2,2x2,1x2, 1x1,2x2,5 seedling fibroids	Grade 0-1	4	mild fluid overload
1	3x3 cm	Grade 1	5	none
1	4x2 cm	Grade 1	5	none
2	2x2 cm, 2x2 cm	Grade 1	4	none
8	4 seedling fibroids, 1x1 cm, 2 x 2 cm, 2x1 cm	Grade 0-1	4	none
6	2 x 2 cm, 2 x 1 cm, 1 x 2 cm, 1.5 x 2 cm, 2 x 2 cm, 1 x 1 cm	Grade 0-1	4	none
4	2 x 2 cm, 1 x 1 cm, 2 x 1 cm, 1 x 2 cm	Grade 0-1	4	none
1	4 x 3 cm	Grade 1	5	None
2	2 x 1 cm	Grade 1	5	none
4	2 x 2 cm	Grade 1	4	none
2	2 x 1 cm	Grade 0-1	5	none
2	2 x 1 cm	Grade 1	5	none
1	3x3 cm	Grade 1	4	none
3	1x3 cm	Grade 0-1	5	none

Conclusion

Our study showed that direct injection of vasopressin to submucous myomas using an ovum pick up needle during hysteroscopic myomectomy is a simple technique with promising results. It was observed that with blanching of the vessels of the myomas, the subsequent operations were nearly bloodless, with good visual clarity and almost no complications. In all 38 cases, the procedure was completed in a single resection and good pregnancy outcome was seen in all infertility patients.

Corson et al. studied the effect of diluted vasopressin on intraoperative bleeding during hysteroscopic surgery. Diluted vasopressin (20 units of vasopressin in 50–100 cc of normal saline) or placebo was injected into the cervical stroma. Results revealed that among a total of 64 women, only 30% of patients in the vasopressin group showed reduced volume deficit during the surgery [11,17].

In another comparison randomized control trial done on 80 patients at Isfahan university, Iran, the mean time of myomectomy was 38.1 and 77.38 min in vasopressin and control groups. The visual clarity score was 8.5 and 6.5 in the vasopressin and control groups, therefore mean surgical operative time for myomectomy was lesser and visual clarity was better in the vasopressin group. Ferguson et al. reported a case of complete large intracavity myomectomy with vasopressin injection. The existing literature confirms that with both intracervical and intralesional injections of dilute vasopressin, surgeons will be able to manage the bleeding and loss of fluid during myomectomy, leading to complete resection of myoma in one session [19 -21].

In a study conducted on 41 patients, 25 (60.9%) became pregnant overall and 20 (48.7%) delivered at term. Seventeen patients delivered a single fetus. Five delivered twins, three at term and two at 33 and 35 weeks. One woman delivered triplets at 31 weeks. The total delivery rate was 56.0%. Two women miscarried, at 6 and 8 weeks, showing improvement in fertility rates after hysteroscopic myomectomy [22,23].

Our study showed that hysteroscopic myomectomy has the advantage of shorter hospitalization and shorter recovery time. With the use of a long ovum pick up needle through the working channel of the diagnostic hysteroscope, we were able to achieve direct contact with the submucous myomas including myomas located high at the fundus. The instruments for injection are readily available and the procedure is quick, simple, and immediately effective with good results.

Therefore, it is concluded that intralesional injection of vasopressin with an ovum pick up needle directly into submucous myoma, during hysteroscopic resection is effective in minimizing fluid deficit, reducing the operative time, better hemostasis and improving visualization; thereby enabling complete resection in a single-step procedure and enhanced pregnancy outcome.

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