



## ROLE OF VASOPRESSIN IN MYOMECTOMY

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### ABSTRACT

Leiomyomas of uterus also known as myomas or fibroids are one of the most common type of tumors in female population. These are smooth muscle tumors and have increased number of arterioles and venules, thus increasing the probability of excessive bleeding during the surgery like myomectomy. To reduce haemorrhage during myomectomy, gynaecologic surgeons often take the preventive step of injecting dilute solution of vasopressin into the uterus or cervix before starting the procedure. Injecting vasopressin in the cervix or uterus has demonstrated reduction of blood loss in several gynaecological surgical procedures like myomectomy, hysterectomy, abortion and conisation. Vasopressin has a huge effect on reduction of blood loss but at same time if injected into a blood vessel inadvertently, bradycardia and cardiac arrest can occur. The main issue that has been under huge concern is the optimal dose and dilution of vasopressin that would reduce the haemorrhage and minimize the probability of cardiac arrest. The objective of this review article is to explain the effectiveness, dosage of vasopressin to reduce the haemorrhage during myomectomy.

**Keywords:** leiomyoma, vasopressin, myomectomy, bradycardia, cardiac arrest

## INTRODUCTION

Uterine Leiomyomas are commonly called as fibroids or myomas. These are smooth muscle tumors which cause an increased number of arterioles and venules in the uterus. Surgery on the Uterus often causes significant haemorrhage. Myomatous uteri since have increased number of arterioles and venules, surgical procedures like myomectomy are often associated with heavy blood loss. Therefore, gynaecological surgeons often use posterior pituitary injection vasopressin before the commencement of the procedure to minimize blood loss during the procedure. Vasopressin is injected into the uterus or cervix before the procedure. Randomized clinical trials have shown that injecting vasopressin before starting different gynaecological procedures like myomectomy, hysterectomy, abortion and conisation result in reduction of blood loss [1-6].

Vasopressin causes reduction in the risk of haemorrhage but may cause bradycardia and cardiac arrest sometimes if injected into a blood vessel inadvertently. The optimal dosage and dilution of vasopressin that causes reduction of haemorrhage and minimizes the risk of haemorrhage is still an unresolved issue. [7-9].

The normal uterus receives its blood supply via uterine arteries, ovarian arteries, arcuate arteries and radial arteries. Normal anastomoses occur between the uterine and ovarian vessels to perfuse the uterus. The arcuate arteries run transversely within the uterine wall and the radial arteries penetrate deeply into the myometrium. The normal vasculature of the uterus is distorted by the presence of fibroids in the uterus. The transversely running arcuate arteries as a result may run at any axis due to the distortion caused by the leiomyoma. A vertical or transverse incision during myomectomy may thus cause transection of these vessels leading to bleeding.

## DISCUSSION

Haemostasis during myomectomy can be achieved by mechanical and pharmacological methods. Ligation of the vascular pedicle at the base of each myoma is the mechanical method to reduce bleeding. One of the pharmacological methods of achieving haemostasis or preventing blood loss during myomectomy is the use of myometrial injection of vasopressin before the procedure.

Vasopressin is one of the 2 hormones secreted by posterior pituitary gland, Oxytocin being the other. Vasopressin has different roles depending upon which receptor it acts upon. It causes vasoconstriction when acts upon V1 receptors, causes antidiuresis through V2 receptors in the kidney. Uterine contractions are stimulated by vasopressin through myometrial V1a receptors. Vasopressin receptors are present in the myometrium of both pregnant and non-pregnant uterus.[10]

### **Usage and Dosage of Vasopressin in myomectomy:**

Vasopressin is diluted with saline as 10 units of vasopressin for every 100 ml of saline. For every centimeter size of fibroid 5 units of vasopressin is used. For e.g.: For a fibroid of size 5 cm, 25 units of vasopressin is diluted in 250 ml of normal saline. The whole of this saline is injected in the myometrium. Using a 10 ml syringe and a laparoscopic injection needle, the injection needle is inserted between the uterus and the myoma. Needle is inserted to a depth of about 2.5 cm. Usually single insertion is sufficient, but the position of the needle may be changed if needed. Multiple injections will cause the injected saline to ooze out from the previous punctures. The colour of the uterus changes from pink to white as the effect of aquadissection with saline and vasopressin. An incision is then made on the uterus.

The vasopressin injected causes vasoconstriction of the myometrial vessels, which helps to hold the saline within the myometrium for a period of about 45-60 minutes which is usually sufficient for the myometrial suturing to be completed. The saline and vasopressin solution follows the path of least resistance and enters the plane between the myometrium and the myoma, which helps in enucleation of myoma. This technique is called Aquadissection. Since this aquadissection causes partial dissection of the myoma-myometrial interface, enucleation of myoma will be easy. The saline-vasopressin solution enters the plane between the myoma and endometrium and pushes the endometrium down and away. This helps the myoma to be easily peeled off. Thus the endometrial avulsion incidence is decreased in cases of intramural myomas.

The aquadissection technique also helps in decrease in the amount of blood loss during myomectomy. 300- 400 ml of blood loss is usually seen in myomectomy. This technique helps to reduce the bleeding to less than 100 ml. This reduced bleeding thus helps in easy suturing and avoids the hurriedness to place the sutures for haemostasis as the field is very clear due to very less bleeding.

### **Procedural tips for using vasopressin:**

- ❖ Dilute the vasopressin in the range of 0.1 to 0.2 U/ml.
- ❖ Careful observations in the change in vitals during the injection should be made. The entire surgical team including the anaesthetist should be informed.
- ❖ Injecting into a blood vessel should be avoided. Double checking should be done.
- ❖ A total dosage of approx. 5 units should not be exceeded.
- ❖ Injection repeated after 45 to 60 minutes of first is safe.
- ❖ The patient should be discouraged of smoking before you plan the surgery.
- ❖ While using vasopressin in patients with established coronary artery or myocardial disease, special cautions should be made.

## Complications of vasopressin:

Bradycardia and Cardiac arrest: Hobo R et al. [7] have reported a case of bradycardia and cardiac arrest during the procedure of laparoscopic myomectomy in which 11.2 units of vasopressin was injected at a dilution of 0.2 units /ml. Within 2 minutes of the injection the heart rate of patient fell to 58 bpm then to 35 bpm and subsequently cardiac arrest followed within 5 minutes. The vitals were returned to normal range and effective cardiac activity reestablished but as a gloomy outcome, the surgery had to be stopped. The possible causes of these events can be summarized as below: Vasopressin induced increase in blood pressure causes vagal- mediated decrease in heart rate. The vasoconstrictive effect of vasopressin causes coronary artery vasospasm thus leading to cardiac ischaemia.

Many case reports on bradycardia and cardiac arrest due to vasopressin have shown these 2 causes:

- A) Administration of vasopressin in a dose of more than 5 units[8, 11]
- B) Unintentional administration of vasopressin into a blood vessel [12]

## CONCLUSION

A gynaecological surgery with minimal blood loss with the operating field clean and unspoiled will be the most rewarding to both the patient and the surgeon. Vasopressin helps to achieve this by preventing the blood loss and thus reducing the need of blood transfusion during the surgery. As with most of the pharmacotherapeutic agents, the safe use of vasopressin i.e. the lowest that is efficacious helps to prevent the complications[9]. Since the maximal safe dose of vasopressin has not been well established, the surgeon's knowledge of its pharmacodynamics and use of safe practices helps in choosing the optimal dosage thus preventing the complications. However, most of the case reports have shown the cardiovascular complications to occur at a dosage of 5 to 11 units. Intravascular injection of vasopressin should be strictly avoided. Vasopressin use may be contraindicated in patients with cardiovascular or renal diseases. Vasopressin certainly helps in a rewarding myomectomy but it should always be used in dilution and at a low total dosage.

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