

## Do you utilize vasopressin in your difficult cesarean delivery surgeries?

👉 Gynecologists often use vasopressin to reduce surgical blood loss. Far fewer obstetricians use the same drug during difficult cesarean delivery surgery. It is time to close the gap.



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Vasopressin is often used to reduce blood loss in gynecologic surgery. Results of randomized clinical trials indicate that its use reduces blood loss in many gynecologic surgery procedures, including hysterectomy, myomectomy, cervical conization, and second trimester pregnancy termination.<sup>1-7</sup> In contrast to the widespread use of dilute vasopressin injection in gynecology surgery, obstetricians

in the United States seldom use vasopressin to reduce blood loss in difficult cesarean delivery surgery. Although there is very little direct evidence from clinical trials on the value of vasopressin in obstetric surgery, high-quality evidence from relevant gynecologic surgery and case reports from obstetricians support its use during difficult cesarean delivery surgery.

as an inhibition constant is 6.8 nM and 35 nM, respectively. Vasopressin's affinity for the oxytocin and vasopressin V1a receptors is 48 nM and 1.4 nM, respectively.<sup>8</sup>

Administering vasopressin into the uterus will achieve a high concentration of the hormone, which stimulates both the oxytocin and vasopressin receptors, resulting in uterine contraction, vasoconstriction, and platelet activation. Of particular importance to obstetricians is that following a prolonged labor or administration of oxytocin, myometrial oxytocin receptors may be downregulated, but vasopressin receptors may remain functional.<sup>9,10</sup>

Vasopressin regulates plasma volume, blood pressure, osmolality, and uterine contractility. The vasopressin V1a receptor is present on vascular smooth muscle cells, platelets, and uterine myocytes. Activating this receptor causes vasoconstriction, platelet activation, and uterine contraction.

Vasopressin reduces surgical blood loss in two ways. The first major mechanism is through vasoconstriction.<sup>11</sup> Second, in uterine surgery specifically, vasopressin stimulates

## Instant Poll



Have you used vasopressin to reduce blood loss in a cesarean hysterectomy or cesarean myomectomy?

When you use vasopressin to reduce surgical blood loss, what is the dose and dilution that you use?

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Please include your name and city and state.



## Biology of oxytocin and vasopressin

Oxytocin and vasopressin are fraternal twin nanopeptides that differ by only two amino acids and are secreted from the posterior pituitary. The human uterus contains both oxytocin and vasopressin receptors; stimulation of either receptor causes uterine contraction. Vasopressin receptor activation also causes vasoconstriction and platelet activation.

Given the similar biochemistry of oxytocin and vasopressin it is not surprising that each hormone is capable of binding to both oxytocin and vasopressin receptors. The affinity of oxytocin for the oxytocin and vasopressin receptors as expressed

CONTINUED ON PAGE 10

uterine contraction. The hormone exerts its antidiuretic action through the V2 receptor in the kidney.

## Optimal vasopressin dose

In gynecologic surgery, the vasopressin doses utilized to reduce blood loss range from 5 U to 20 U diluted in 20 mL to 200 mL of saline. Randomized trial results indicate that a vasopressin dose of 4 U is effective in reducing blood loss during second trimester pregnancy termination,<sup>7</sup> and a dose of 3 U is effective in reducing blood loss during cervical conization.<sup>5,6</sup> There is insufficient obstetric literature to determine the optimal dose of vasopressin to reduce blood loss in difficult cesarean delivery surgery, but doses similar to those used in gynecologic surgery should be considered.

**Possible effects of vasopressin overdosing.** In gynecologic surgery, injection of vasopressin has been reported to cause bradycardia, hypotension, myocardial infarction, and cardiovascular collapse.<sup>12</sup> Given that multiple vasoactive medications may be given to a patient undergoing a complex cesarean delivery, including oxytocin, methergine, and ephedrine, it is important for the obstetrician to use the lowest effective dose of vasopressin necessary to facilitate control of blood loss. The obstetrician needs to communicate with the anesthesiologist and coordinate the use of dilute vasopressin with other vasoactive medications.

**Avoid intravascular injection of vasopressin.** I prefer to inject vasopressin in the subserosa of the uterus rather than to inject it in a highly vascular area such as the subendometrium or near the uterine artery and vein.

## Vasopressin reduces blood loss during hysterectomy

One randomized trial has reported that the administration of 10 U of vasopressin diluted in saline into the lower uterine segment reduced blood loss at abdominal hysterectomy in nonpregnant women compared with an injection of saline alone (445 mL vs 748 mL of blood loss, respectively).<sup>1</sup> There are no clinical trials of the use of vasopressin in cesarean hysterectomy. However, abdominal hysterectomy procedures and cesarean hysterectomy are similar, and vasopressin likely helps to reduce blood loss at cesarean hysterectomy.

## Vasopressin reduces blood loss during myomectomy

Authors of 3 small, randomized clinical trials in nonpregnant women have reported that the intramyometrial injection of dilute vasopressin reduces blood loss during myomectomy surgery.<sup>2-4</sup> The vasopressin doses in the 3 trials ranged from 5 U of vasopressin in 100 mL of saline to 20 U of vasopressin in 20 mL of saline. A Cochrane meta-analysis of the 3 studies concluded that, at myomectomy, the intramyometrial injection of dilute vasopressin was associated with a significant reduction in blood loss compared with placebo (246 mL vs 483 mL, respectively).<sup>13</sup>

There are great similarities between myomectomy in the nonpregnant and pregnant uterus. Given the clinical trials data that support the use of vasopressin to reduce blood loss during myomectomy in the nonpregnant uterus, it is likely that vasopressin also would reduce blood loss during myomectomy

performed at the time of a cesarean delivery.

At cesarean delivery, elective myomectomy of intramural fibroids is generally not recommended because of the risk of massive blood loss. Clinicians often remove large pedunculated fibroids because this surgery does not usually cause massive bleeding. However, on occasion it may be necessary to perform a myomectomy on intramural myoma(s) in order to close a hysterotomy incision.

For myomectomy surgery performed at the time of cesarean delivery, many techniques have been utilized to reduce blood loss, including:

- intravenous oxytocin infusion<sup>14,15</sup>
- injection of oxytocin into the myoma pseudocapsule<sup>15</sup>
- electrosurgery<sup>16-18</sup>
- argon beam coagulator<sup>19</sup>
- uterine tourniquet<sup>20</sup>
- premyomectomy placement of a uterine U stitch<sup>21</sup> or purse string suture<sup>22</sup>
- O'Leary sutures<sup>23,24</sup>
- temporary balloon occlusion of pelvic arteries<sup>25</sup>
- vasopressin injection.<sup>26</sup>

Given the widespread use of vasopressin injection in gynecologic surgery to reduce blood loss at myomectomy, obstetricians should consider using vasopressin in their cesarean myomectomy surgery.


## Use of vasopressin during cesarean delivery for placenta previa may reduce blood loss

Women with a complete placenta previa require a cesarean delivery to safely birth their baby. Cesarean deliveries performed for this indication are associated with an increased risk of hemorrhage. In one case series of 59 patients with placenta

previa undergoing cesarean delivery, 4 U of vasopressin diluted in 20 mL of saline was injected into the placental implantation site to reduce blood loss. Among the patients receiving vasopressin injection, the blood loss was 1,149 mL. Among 50 women with placenta previa who did not receive vasopressin injection, the blood loss was 1,634 mL.<sup>27</sup>

## Obstetric surgery and vasopressin: The time has come

As obstetricians and gynecologists we constantly strive to improve the effectiveness of our surgical procedures and reduce adverse outcomes, including infection and blood loss. The use of vasopressin is widely accepted in gynecologic surgery as an adjuvant that reduces blood loss.

The time has come to expand the use of vasopressin in difficult obstetric surgery. 



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