

Anesthesia Considerations in Placenta Accreta Spectrum

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Financial Disclosures

- No financial disclosures

Objectives

1

1. Recognize the role of obstetric anesthesiologists in multidisciplinary planning for placenta accreta spectrum (PAS) surgery.

2

2. Compare the pros and cons of neuraxial vs. general anesthesia for Cesarean hysterectomy.

3

3. Discuss the advantages and disadvantages of placing central venous catheters vs. peripheral IV catheters in patients with placenta accreta spectrum.

4

4. Formulate a plan for postoperative pain management for patients undergoing Cesarean hysterectomy.

Role of Obstetric Anesthesiologist



1-year fellowship in Obstetric Anesthesia

Referral centers for PAS
>50% of OB Anesthesia fellows have done 5+ PAS cases by graduation



Multidisciplinary planning → coordinate care with other members of the team including surgeons, transfusion medicine specialists, nursing, neonatologists, critical care physicians



High-Risk OB Anesthesia Clinic → formulate a plan



Intraoperative and Postoperative analgesia



Oversee transfusion-related decision-making

Factors Influencing the Primary Mode of Anesthesia

Patient

- Obesity, difficult airway, scoliosis, medical co-morbidities
- Degree of PAS → possibility of massive hemorrhage
- PREFERENCE! May be fearful of neuraxial or general

Surgical

- Type and size of incision
- Timing of hysterectomy
- Placement of vascular occlusion devices

Clinician

- Level of experience
- Availability of more than 1 anesthesia staff member

Placenta Accreta Spectrum Disorders: Knowledge Gaps in Anesthesia Care

Christine M Warrick¹, John C Markley², Michaela K Farber³, Mrinalini Balki⁴, Daniel Katz⁵, Philip E Hess⁶, Cesar Padilla⁷, Jonathan H Waters⁸, Carolyn F Weiniger⁹, Alexander J Butwick⁷

Table 2. Study Data of Anesthesia Modes Used for Patients With Placenta Accreta Spectrum Disorders

Reference (first author, year of publication)	Sample size (N)	Country of origin	Patients who underwent cesarean hysterectomy (%)	Primary GA (%)	Primary NA (%)	Conversion from NA to GA (%) ^a
Eller et al (2009) ⁹	76	United States (Utah)	97	76	16	8
Lilker et al (2011) ¹¹	23	Canada (Ontario)	30	26	52	22
Kocaoglu et al (2012) ¹⁰	28	Turkey	61 ^b	86	7	7
Grace Tan et al (2013) ²⁵	27	Australia	100	100	0	0
Shamshirsaz et al (2015) (nonmultidisciplinary group) ¹⁶	33	United States (Texas)	NS	53	25	22
Shamshirsaz et al (2015) (multidisciplinary group) ¹⁶	57	United States (Texas)	NS	46	10	44
Nguyen-Lu et al (2016) ¹²	50	Canada (Toronto)	72	12	62	26
Taylor and Russell (2017) ¹⁴	40	United Kingdom	60	5	53	43
Wang et al (2017) ¹⁵	96	China	13	8	72	20
Markley et al (2018) ¹⁷	81	United States (Massachusetts)	93 ^b	9	73	19
Riveros-Perez and Wood (2018) ¹³	43	United States (Colorado)	91	9	21	70
Binici and Büyükfırat (2019) ¹⁸	43	Turkey	<9	77	19	5

Data presented as n or %. Sum totals in each row may be >100% due to rounding.

Abbreviations: GA, general anesthesia; NA, neuraxial anesthesia.

^aIncludes planned and unplanned conversion from neuraxial to general anesthesia.

^bAll subjects with concurrent placenta previa.

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Table 1. Potential Advantages and Disadvantages of Neuraxial, General, and Combined Neuraxial-General Anesthesia for Cesarean Hysterectomy

Anesthetic modality	Advantages	Disadvantages
Neuraxial anesthesia	<ul style="list-style-type: none"> Patient is awake Bonding possible Lower incidence of Apgar <7 Minimal effect on uterine tone Possibly lower blood loss Possibly superior postoperative pain management depending on surgical incision Reduced ICU admission 	<ul style="list-style-type: none"> Possible need for emergent conversion to GA Inferior operative conditions Intraoperative nausea and vomiting Risk of neuraxial block failure Need for maternal anxiolysis or sedation Concern for epidural hematoma in a high-blood loss surgery
General anesthesia	<ul style="list-style-type: none"> Airway secured Controlled ventilation Superior operative conditions 	<ul style="list-style-type: none"> Risk of postdural puncture headache Failed intubation/airway disasters Unwarranted use of general anesthesia if PAS not identified Fetal exposure to anesthetic medications Volatile anesthetic decreases uterine tone Higher magnitude of blood loss Higher incidence of Apgar score <7 Negative effect on neonatal bonding and breastfeeding Postoperative nausea and vomiting May require high-dose systemic opioid for postoperative pain control
Elective conversion from neuraxial to general anesthesia after delivery	<ul style="list-style-type: none"> Reduced fetal exposure to anesthetics Patient can see and bond with neonate Airway secured for the resuscitation phase of case 	<ul style="list-style-type: none"> Timing of laryngoscopy and intubation may not be ideal Hemodynamic instability after induction of general anesthesia in the presence of a neuraxial sympathectomy and/or possible hemorrhage

Abbreviations: GA, general anesthesia; ICU, intensive care unit; PAS, placenta accreta spectrum.

Mode of anesthesia and clinical outcomes of patients undergoing Cesarean delivery for invasive placentation: a retrospective cohort study of 50 consecutive cases

Nhathien Nguyen-Lu¹, Jose Carlos Almeida Carvalho^{1 2}, John Kingdom², Rory Windrim², Lisa Allen², Mrinalini Balki^{3 4}

Retrospective cohort study
50 women with PAS
68% regional anesthesia
32% general anesthesia

No difference in mean
blood loss, blood
transfusion units

Significantly higher
neonatal mean APGAR
scores at 1 and 5 minutes in
women who received RA
before delivery

More postoperative
respiratory complications in
GA

Is there a difference in maternal and neonatal outcomes when utilizing general anesthesia vs. regional anesthesia in patients undergoing Cesarean delivery for PAS?

Neuraxial to general anesthesia conversion has equitable intraoperative and improved post-operative outcomes compared to general anesthesia in cesarean hysterectomy for placenta accreta spectrum (PAS)

Jessian L Munoz¹, Alixandria F Pfeiffer¹, Jacqueline Curbelo², Patrick S Ramsey¹, Kayla E Ireland¹

Case-control study of 85 PAS cases undergoing Cesarean hysterectomy from 2005 - 2020

61% general anesthesia, 39% neuraxial → GA after delivery

Similar operative times, estimated blood loss, maternal morbidity, ICU admission, ICU length of stay

Total postoperative length of stay reduced in patients with neuraxial anesthesia (3.76 vs. 6.35 days)

Is there a difference in maternal outcomes when utilizing general anesthesia vs. regional anesthesia followed by conversion to general anesthesia in patients undergoing Cesarean hysterectomy for PAS?

General versus Regional Anesthesia and Neonatal Data: A Propensity-Score-Matched Study

Liviu Cojocaru¹, Cristiana Salvatori², Amir Sharon², Hyunuk Seung³, Katherine Nyman⁴, Bhavani S Kodali⁵, Ozhan M Turan¹

Retrospective case-control study
July 2014 – August 2020
60 cases each group (RA vs GA)

IADT time similar (41.5 and 46 min)
Uterine incision to delivery time similar (1.5 vs 2 min)

No significant difference in arterial or venous cord pH
No association between maternal characteristics and APGAR's at 5 min, except at 1 min

No difference in NICU admission or NICU length of stay

Is there a difference in neonatal outcomes with general anesthesia vs. regional anesthesia when induction of anesthesia to delivery time (IADT) is prolonged (>10 minutes)?

Neonatal Outcomes

Large-scale high-quality observational studies in PAS are lacking

Patients with suspected PAS usually undergo planned preterm delivery

Prolonged NICU admission and morbidity can occur more often after unplanned Cesarean delivery

To evaluate potential effect of general anesthesia → studies need to disentangle effects of:

- preterm delivery
- maternal hemorrhage
- preeclampsia
- prolonged rupture of membranes
- oligohydramnios
- non-reassuring fetal heart rate tracings

Impact of anesthesiologist's fellowship status on the risk of general anesthesia for unplanned cesarean delivery

Jennifer L Wagner ¹, Robert S White ¹, Elizabeth A Mauer ¹, Kane O Pryor ¹, Klaus Kjaer ¹

Anesthesiologist Specialization and Use of General Anesthesia for Cesarean Delivery

Benjamin T Cobb ¹, Meghan B Lane-Fall, Richard C Month, Onyi C Onuoha, Sindhu K Srinivas, Mark D Neuman



Presence of fellowship-trained OB anesthesiologist reduces the odds of receiving general anesthesia for Cesarean delivery (non-PAS cases)



Logistics of scheduling varies across institutions



Anesthesiologist and CRNA vs. fellowship-trained OB anesthesiologist and fellow/resident (teaching hospital)



Up to 50% of PAS cases go earlier than scheduled → may be difficulty in providing an experienced team on short notice

Location of Delivery & Postoperative Care

> [Int J Obstet Anesth.](#) 2018 May;34:56-66. doi: 10.1016/j.ijoa.2018.01.008. Epub 2018 Feb 2.

Risk-stratification, resource availability, and choice of surgical location for the management of parturients with abnormal placentation: a survey of United States-based obstetric anesthesiologists

T R Grant ¹, E H Ellinas ², A O Kula ¹, M Y Muravyeva ¹

- No consensus on location for delivery
- L&D OR, Main OR, IR suite, Hybrid OR
- Preferred location for advanced cases is Main OR by 71% of US OB Anesthesia Division Chiefs
- Consensus also lacking on preferred location for postop care

Central vs. Peripheral Venous Access

Peripheral Venous Access

- Advantages
 - Large bore IV catheters can achieve high flow rates
 - More comfortable for the patient
 - Lower risk of infection (don't need full sterile barrier)
- Disadvantages
 - May infiltrate with high pressure
 - Flow may be restricted in a hypovolemic patient with high sympathetic tone
 - Cannot monitor CVP

Central Venous Access

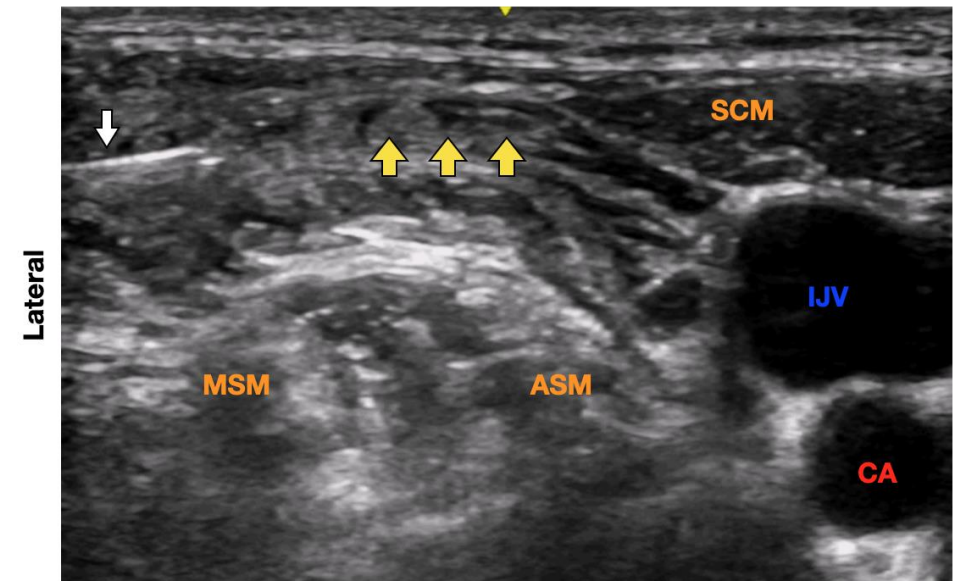
- Advantages
 - Ability to monitor CVP, CO
 - Ability to administer high-dose vasoactive + inotropic infusions
- Disadvantages
 - Risk of arrhythmias, pneumothorax, arterial puncture
 - Time-consuming to place in an emergency
 - Uncomfortable for the patient if doing awake

Central vs. Peripheral Venous Access

> *A A Pract.* 2021 Mar 19;15(3):e01429. doi: 10.1213/XAA.0000000000001429.

Superficial Cervical Plexus Block for Awake Large-Bore Central Line Placement in Parturients: A Case Series

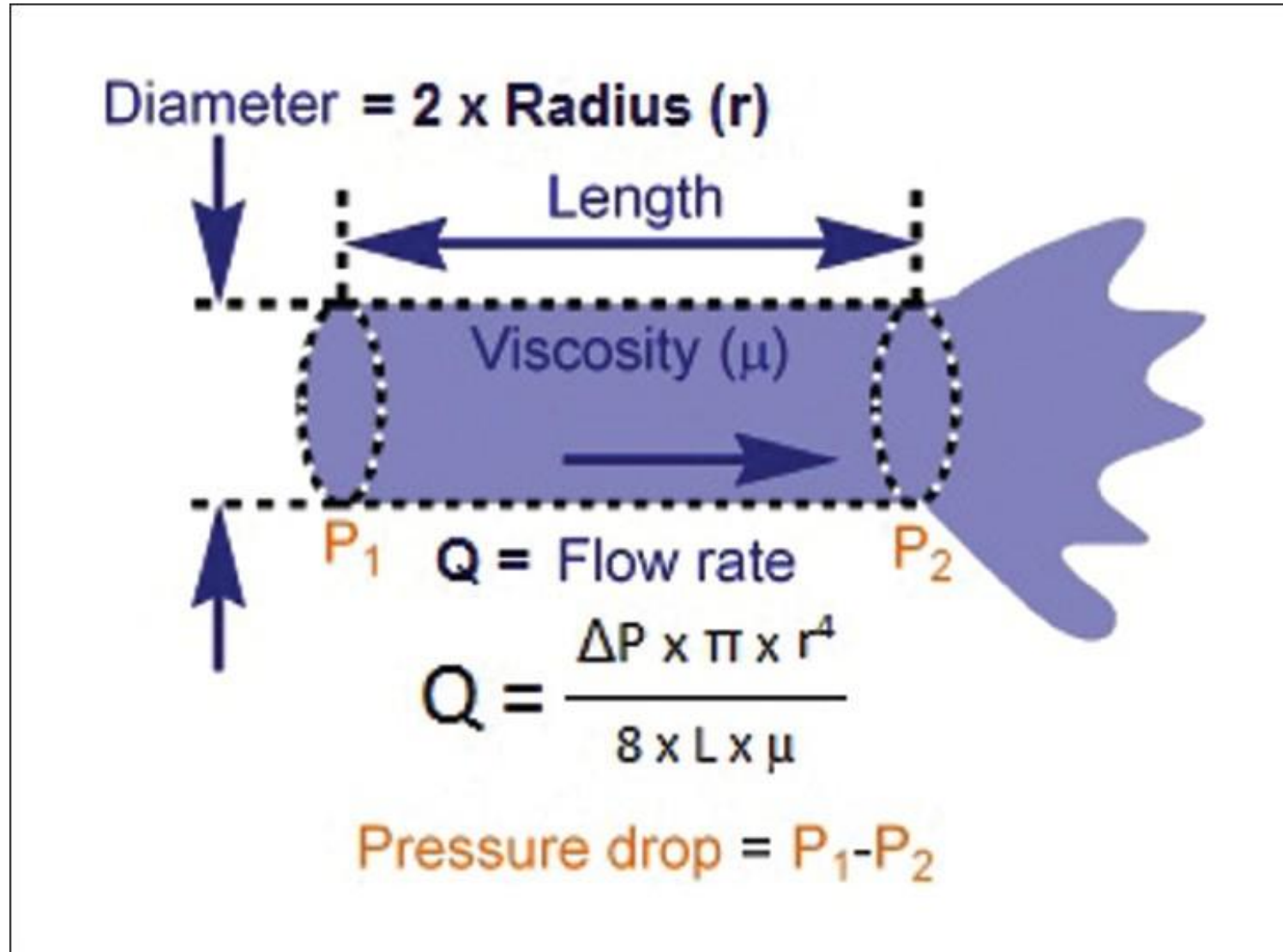
Maria Sheikh ¹, Brendan Carvalho ², Jan Boublik ², Jessica Ansari ²



- Superficial cervical plexus is easy to block with 5-10cc of 1% lidocaine
- Provides anesthesia from external auricular area to below clavicle
- Low reported complication rates

Vascular access, fluid resuscitation, and blood transfusion in pediatric trauma

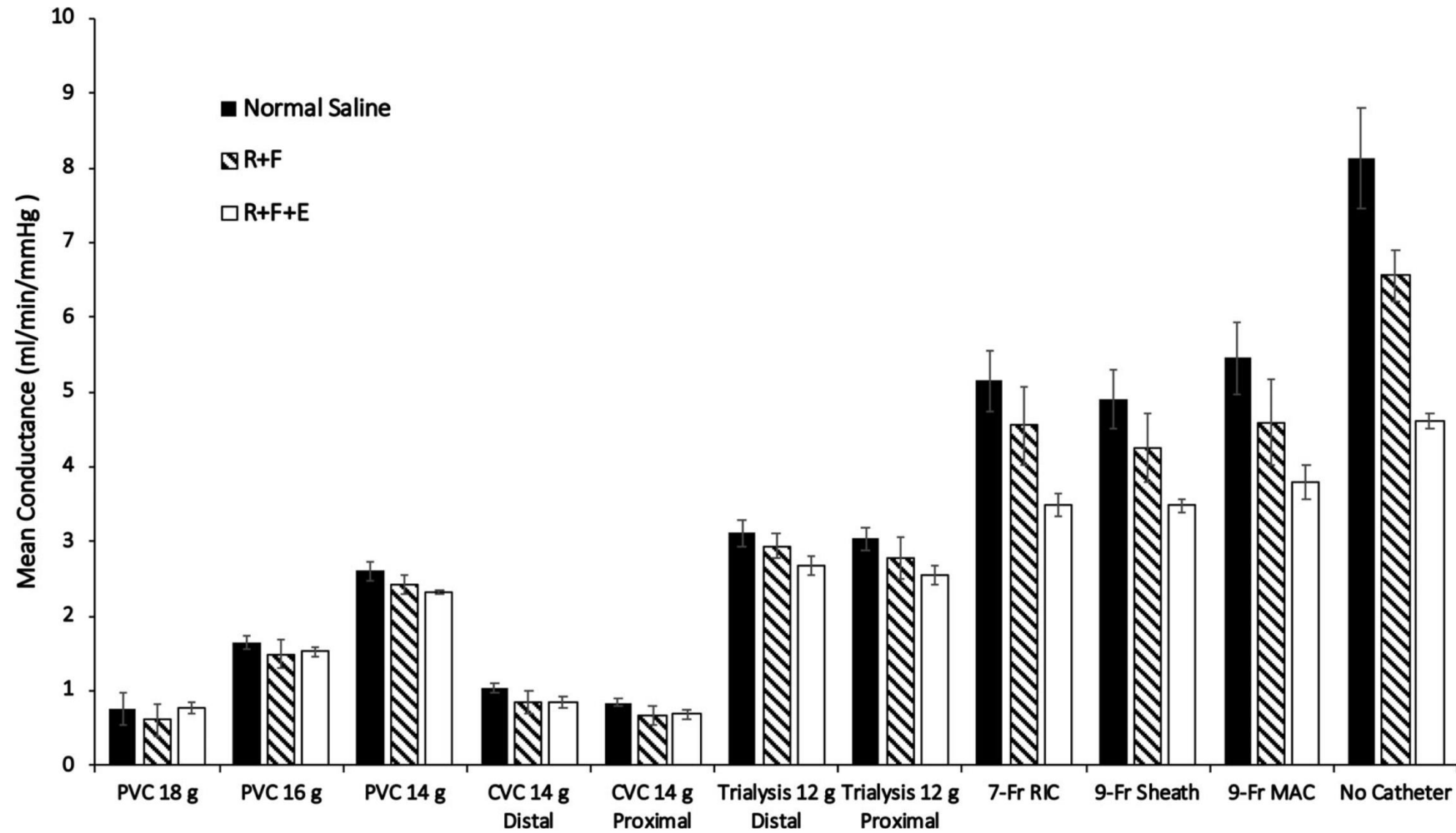
Nathaniel Greene,¹ Sanjay Bhananker,^{1,-3} and Ramesh Ramaiah^{1,2}



Performance assessment of intravenous catheters for massive transfusion: A pragmatic in vitro study




MILNE ET AL.

Andrew Milne¹, Justin J Teng², Andrew Vargas³, John C Markley², Adam Collins⁴



Performance assessment of intravenous catheters for massive transfusion: A pragmatic in vitro study

Andrew Milne ¹, Justin J Teng ², Andrew Vargas ³, John C Markley ², Adam Collins ⁴

Catheter	Type	Flow (ml/min)	Pressure (mmHg)
Braun Introcan 18G	Peripheral	231	300
Braun Introcan 16G	Peripheral	458	300
Braun Introcan 14G	Peripheral	698	300
Arrow Two-lumen 14G Distal Port	Central	255	300
Arrow Two-lumen 14G Proximal Port	Central	205	300
Bard Trialysis 12G Distal Port	Central	799	300
Bard Trialysis 12G Proximal Port	Central	765	300
 Arrow 7 Fr Rapid Infusion Catheter	Peripheral	1000	287
 Arrow 9 Fr PSI Kit	Central	1000	287
 Arrow 9 Fr MAC	Central	1000	264
Control (No catheter)	Central	1000	217

Postoperative Pain Management

Neuraxial morphine

Transversus abdominis plane (TAP) or Quadratus lumborum (QL) block

Epidural Infusion

Multimodal IV/PO Pain Medications

Knowledge Gaps

- Optimal staffing models for scheduled and unscheduled delivery
- Ideal surgical location for delivery (L&D vs. Main OR)
- Mode of anesthesia
- Ideal ratio of blood product transfusion
- Use of pharmacological adjuncts for hemorrhage management
- Neuraxial and regional blocks for postoperative analgesia
- Preferred location for postpartum care