

# The Modern-day C-section

JADE RITTER, CST

## HISTORY OF THE CAESAREAN

A Caesarean section is a surgical procedure in which one or more incisions are made through a mother's abdomen and uterus to deliver one or more babies, or, rarely, to remove a dead fetus. The first modern Caesarean section was performed by German gynecologist Ferdinand Adolf Kehrer in 1881.<sup>5</sup>

The first successful Caesarean section performed in America took place in Mason County Virginia (now Mason County West Virginia) in 1794. At that time, a woman named Elizabeth, was experiencing a difficult labor and was convinced she was going to die. She insisted that a Caesarean be performed so the baby could be saved. Her delivery doctor refused to do the operation, but her husband Jesse Bennett, also a doctor, agreed. He performed the operation and delivered a baby girl.<sup>9</sup>

Although "Caesarean section is usually performed when a vaginal delivery would put the baby or the mother's life or health at risk,"<sup>5</sup> in recent years some women have elected for the operation instead of vaginal delivery. The C-section rate has climbed more than 50% since 1996, according to the National Center for Health Statistics, which is part of the Centers for Disease Control and Prevention.<sup>8</sup> In the most recent data submitted by ACOG (American Congress of Obstetricians and Gynecologists) available, 31.8% of births were by Caesarean.<sup>1</sup> Nearly one in three babies are now delivered surgically.

"C-section rates may be on the rise for a variety of reasons, the average age of the expectant mother is higher, the rising obesity rate among moms-to-be, and an increase in multiple births and an increase in induced labors. Additionally, because of some health reports warning the dangers of attempting a vaginal delivery after a Caesarean (VBAC), there has also been a decrease in the number of women attempting vaginal deliveries for subsequent deliveries."<sup>2</sup>

## LEARNING OBJECTIVES

- ▲ Learn about the procedure for the modern-day Caesarean section
- ▲ Review what instruments are needed for this procedure
- ▲ Examine the indications that may require a C-section to be the necessary procedure for delivery
- ▲ Define the differences between a spinal and epidural anesthesia
- ▲ Discuss the complications of this common surgery

## TYPES OF CAESAREAN SECTION

There are several types of Caesarean section. An important distinction is the type of incision made on the uterus, which is different than the incision on the skin. The lower uterine segment section is the procedure most commonly used. It involves a transverse cut just above the edge of the bladder and results in less blood loss and is easiest to repair. The classical Caesarean section involves a mid-line longitudinal incision which allows a greater space to deliver the baby. It is rarely performed today due to the increase in possible complications.

Once labor has commenced due to unexpected labor complications, an unplanned Caesarean section is performed. A stat/emergency C-section is performed in a true obstetrical emergency, where complications of pregnancy onset suddenly during the process of labor and quick action is required to prevent the death of the mother, child(ren) or both.

A repeat Caesarean section is performed when a

patient has had a previous Caesarean section and is typically performed through the old scar incision. This is usually done at 39 weeks or later unless there is a medical indication that the baby needs to be delivered prior to 39 weeks.

The obstetrician must use discretion to decide whether a Caesarean is necessary. Some indications for Caesarean delivery are:<sup>25</sup>

- Fetal distress: refers to what happens when an unborn baby starts to have problems while the mom is in labor, ie, deceleration in the heart rate.
- Cord prolapse: umbilical cord precedes the fetus' exit from the uterus. The fetus moves downward into the pelvis and puts pressure on the cord. As a result, oxygen and blood supplies to the fetus are compromised and the baby must be delivered quickly.
- Prolonged labor or failure to progress (dilate)
- Serious maternal health problems where a delivery through the vagina would put the baby at risk such as herpes or AIDS.
- PIH (pregnancy induced hypertension) after amniotic rupture
- Placental problems
- Placental abruption (where the placental lining has separated from the uterus of the mother)
- Placental previa ( where the placenta is attached to the uterine wall close to or covering the cervix)
- Placental Accreta (where the placenta attaches itself too deeply in the wall of the uterus but does not penetrate the uterine muscle. Hemorrhaging is the biggest concern with this condition due to manual attempts to detach the placenta)
- Failed labor induction
- Contracted pelvis
- Overly large baby (macrosomia)
- Abnormal presentation (breech or transverse positions)
- Uterine rupture

## INSTRUMENTS

2 Knife handles with 2 #10 blades	4 curved hemostats
1 curved mayo scissor	2 needledrivers
1 curved metzenbaum scissor	1 Suture scissor
1 bandage scissor	1 Doyen Retractor (Bladder Blade)
1 Russian forcep	1 Bull retractor
1 Ferris Smith forcep	1 Richardson retractor
2 Adson forceps	4 Ring forceps
2 Kocher clamps	1 Rat tooth tissue forcep
4 Allis clamps	

## PRE-OPERATIVE PROCEDURES

All patients having a Caesarean will have blood work drawn prior to their surgery. This consists of a Type and Screen which ensures that a patient who may need a blood transfusion during surgery receives blood that matches her own and that clinically significant antibodies are identified if present. Patients must receive blood of the same blood type; otherwise, a severe transfusion reaction may result. A CBC to monitor hemoglobin, hematocrit, and plate-





Jade Ritter, CST, assists with a Caesarean section

let counts is needed to measure the types and number of blood cells and also to determine if the blood is normal. This test also shows signs of infection, dehydration, anemia, the need for post-surgery transfusion, etc. “A RPR (Rapid Plasma Reagin) is also done, which is a blood test to check for syphilis antibodies in patients who may not have symptoms. The CDC and the US Preventive Services Task Force (USPSTF) recommend all pregnant women be screened for syphilis during pregnancy.”<sup>12,13</sup>

The patient is told not to eat or drink anything eight hours prior to surgery if it is a scheduled Caesarean. An IV is started on the patient typically

using an 18G or larger needle. A lactated Ringers solution of a minimum of 1,000mL is infused prior to the patient entering the OR suite. Pre-op meds are given approximately 30 minutes before surgery. This includes cefazolin 1 gm IVPB x 1 if patient weighs <80Kg or cefazolin 2 gm IVPB x1 if patient weighs > 80 Kg. This is given routinely to prevent post-operative infection. The patient is also given one or a combination of heartburn relief medication between 2 hours and not less than 30 minutes prior to surgery. A combination of citric acid/sodium citrate may also be given by mouth 30 to 45 minutes prior to the scheduled surgery. These medications are given to neutralize gastric acid in the event of the patient possibly aspirating stomach contents. The patient is brought to the OR where she is positioned sitting up on the OR table so a spinal or epidural anesthesia block can be placed. This regional anesthetic is used so the mother can remain awake and interact immediately with her baby. The difference between a spinal and an epidural is as follows.

- Spinal Anesthetic involves the administration of a needle, in the lumbar region, between the vertebrae through the epidural, beyond the dura, and just before the spinal cord. This injection is directly into the spinal fluid followed by the injection of a local anesthetic solution. This onset of anesthesia is very rapid and generally lasts around 2 hours after it's placed. “A long lasting pain medication, morphine, can be injected along with the spinal anesthetic, but the duration of pain relief is only about 12 to 24 hours.”<sup>7</sup>
- During the placement of an epidural, the needle tip is placed in the epidural space, which lies just outside the membrane covering the spinal fluid. An epidural can progress slower and may result in a denser block, allowing some sensation at the surgical site. An epidural can be left in place to treat pain effectively post-surgery.<sup>7</sup>

“The main difference between the two is how it is

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administered and that the spinal anesthetic has a higher incidence of spinal headaches (where spinal fluid leaks from the injection site and causes a headache from the spinal cord pulling down from the loss of equilibrium. A spinal headache can be treated with painkillers and oral fluids. If this does not work, a blood patch can be performed, which



is a procedure where the patient's own blood is injected into the epidural space in the same region where the original spinal block was done, thus eliminating the headache.”<sup>7</sup> This procedure is performed by an anesthesiologist.

After placement of the anesthetic by the anesthesiologist, the patient is put in the supine position with a wedge underneath the right hip. Uterine displacement to the left during surgery is necessary to shift the uterus away from the large abdominal vessels. The positional effect on cardiac output is of major importance in avoiding maternal hypotension and maintaining fetal well-being. Heart tones of the baby are monitored with a hand-held Doppler prior the start of surgery so documentation can be made of the baby's heart rate. Normal fetal heart rate varies between 120 to 160 beats per minute (bpm). At this time, the patient has a Foley catheter inserted that will stay in for 24 hours and her abdomen is prepped for surgery using abdominal gel prep. The patient has SCD (sequential compression device) applied to the legs during surgery to prevent DVT (deep vein thrombosis) blood clotting in the legs. The patient is draped with a bipod that goes over her feet and legs, and a laparotomy drape — with built-in pouch to collect the amniotic fluid when her water is broken — is placed on the

abdomen. At this point, a time out is done with everyone in the entire OR suite, using active communication to be briefly documented and should include: asking the patient her name, the correct site, and agreement on what procedure she is having performed. A liter of normal saline is poured into a basin by the circulator for irrigation if the physician chooses to use it.

The skin is tested before the incision is made to ensure the patient is numb. After the patient is tested, the circulator retrieves the significant other/family member to accompany the mom in the OR suite as a support person. If, due to an emergent and stat situation and mom has had no prior epidural or spinal anesthesia, a general anesthetic is performed and no support person would be allowed in the OR suite.

#### INTRAOPERATIVE

A horizontal incision is made into the lower abdomen. A scalpel with a #10 blade is used to make the incision. Dissection is made until a shiny, fibrous layer called the fascia is seen.

The fascia which lies over the abdominal muscles, also serves as a floor for the adipose layer just cut into. A finger is placed by each surgeon's hand against this fascia to move away the adipose tissue, exposing an adequate length of this tough lower layer. “The scalpel is then used to ‘nick’ an opening into the fascia that runs up and down from the upper abdomen to the pubic bone. They are joined together at the midline,”<sup>6</sup> being dissected away using a pair of curved Mayo scissors.

Uterine displacement to the left during surgery is necessary to shift the uterus away from the large abdominal vessels. The positional effect on cardiac output is of major importance in avoiding maternal hypotension and maintaining fetal well-being.

The next layer is the peritoneum, a film-like layer that is the lining of the abdominal cavity. Two curved hemostats



are used to grasp this layer. The layer is separated with a curved Metzenbaum scissor. The dissection is made up and down to see the lower abdomen with good visibility. "Because the bladder wraps itself under the lowermost portion of this lining, care is taken not to injure it. Once the opening is made into the peritoneum, a 'bladder blade' (Doyen Retractor) is placed to pull the lowest part of the opening downward,"<sup>6</sup> so the peritoneal incision is not taken down too far, thus getting into the bladder. The uterus is then exposed, with the other half of the bladder riding up to the lowest part of the uterus and a bladder flap is created. This is to push the bladder away from the rest of the surgery and is done with a pair of smooth tissue forceps (usually Russians) and a pair of Metzenbaum scissors. The uterine incision is made with a second, clean #10 blade. If the patient's amniotic sac has not broken it will protrude through the uterine incision. The bag of water is artificially ruptured using a blunt instrument, such as an allis clamp.

The baby's head is delivered through the uterine incision with a bulb syringe readily available for suctioning of the infant's nose and throat. Once the baby's body is delivered, the cord is clamped with an infant cord clamp and one Kocher clamp and dissected between the two with a pair of curved Mayo scissors/or bandage scissors freeing the baby from placenta. The newborn will then be taken to an infant warmer to be assessed by a neonatal nurse and/or pediatrician. At this point, the clamp is removed from the cord that is attached to the placenta and a cord blood specimen is obtained to get baby's blood type. The placenta is removed manually by the surgeon with fragmented pieces adhered to the uterus removed by a ring forcep (Foerster). "The uterus, anchored into the pelvis by ligaments that attach to it near its bottom, is easily tilted through all of the incisions and laid on the mother's abdomen for easy access."<sup>6</sup> However, some physicians leave the uterus in place in the abdomen. This is strictly the physician's preference. Twenty units of oxytocin usually is administered through the IV so the uterus will contract and help control bleeding.<sup>10</sup>

The uterine incision is then closed typically using a



*Once the baby is delivered, the newborn is handed to a neonatal nurse and/or pediatrician and the infant is assessed*



0-polyglactin 910 suture on a CT-1 needle that will dissolve in several weeks. "The closure stops the bleeding from the edges of the incision. If there is no further bleeding at this re-approximated incision line, the uterus is allowed to fall back into the pelvis."<sup>6</sup> The peritoneum is left open or closed due to physician's preference. If closed it is usually with a 2-0 or 3-0 polyglactin 910 suture with a tapered needle. "Recent studies have indicated if closed it might lead to internal scarring called adhesions."<sup>6</sup> A uterine count is performed, which consists of counting sponges. With Cesarean sections, an extra count is performed due to the opening of the uterus with the uterine layer being the extra count.



*The newborn has its vitals assessed as it lays on an infant warmer*



*After it has been determined the infant has a good bill of health, it is swaddled and prepared to meet his or her mother*

The next layer, “the abdominal muscles, are usually left open as well because they too usually fall together by themselves.”<sup>6</sup> However, tying them together at spots along their lengths can be done using a 2-0 or 3-0 polyglactin 910 suture. The fascia layer is the most important layer to close since it is the support layer for the abdomen. This layer needs to be closed with a thicker, more durable suture such as 0 polydioxanone or 0 polyglactin 910 suture. A full count is done with the circulator at this point, which consists of sponges, needles, blades, Bovie tip and instruments.

The subcutaneous layer is physician preference as well,

but if closed it is usually done with a 3-0 plain gut suture. The skin, the weakest re-approximation of the whole repair, is gently brought together with Adson forceps and either stapled, sutured or glued. If sutured, this is usually done with a 2-0 or 3-0 Prolene on a Keith needle or, if glued, using a tissue adhesive. A final count is done with

‘C-section rates may be on the rise for a variety of reasons, the average age of the expectant mother is higher, the rising obesity rate among moms-to-be, and an increase in multiple births and an increase in induced labors. ...’

the circulator consisting of sponges, needles, blades and bovie tip only.

Dressing is applied to stapled or sutured incision using sterile pads and abdominal dressings. If glue is used, no dressing is applied. The fundus is compressed with the hand to make sure the uterus is nice and firm and to check for any bleeding. The entire Caesarean surgery process takes about 30 to 45 minutes unless complications arise.

#### POST OPERATIVELY

The patient is sent to the PACU (Post Anesthesia Care Unit) for approximately 30 to 45 minutes. Vitals are monitored closely and fundal checks are done periodically to check for bleeding. The patient is then transferred to the postpartum unit until she is discharged to home. An average hospital stay for a Caesarean patient is approximately two to four days. A follow up appointment with the obstetrician is usually performed two weeks post-delivery and again at six weeks.

#### COMPLICATIONS AND RISKS

A Caesarean is a relatively safe procedure. However, it is a major surgery. As with any surgery, it has complications and risks that can include:

- Increased bleeding
- Reactions to anesthesia (nausea, vomiting, spinal headache)



- Blood clots in the legs or lungs (the risk of this is greater after a C-section than with a vaginal birth. If the blood clot goes to the lungs, which is called pulmonary embolism, the damage can be life-threatening.)
- Endometritis (inflammation and infection of the membrane lining the uterus, which may cause chills, fever, back pain, etc. It can be treated with IV antibiotics.)
- Surgical injury. Although rare, surgical injuries to nearby organs can occur during a C-section. If this happens, additional surgery may be needed.”<sup>3</sup>
- Wound infection

Because of advances in medical technology, Caesareans are now a safe procedure that saves millions of lives, both mothers and infants, every year.



#### ABOUT THE AUTHOR

Jade Ritter, CST, studied at IU Health Bloomington Hospital Surgical Technology Program and has been a CST specializing in Obstetrical and Gynecological care for 13 years. In addition to being a CST, he is responsible for ordering all OBOR surgery supplies for the department.

In the past, he has served on the IU Health Bloomington Advisory Board of Directors for the Surgical Technology Program.

He has been an active member of AST since 1998. He has been married for eight years to his wife Beth (who is a Charge Nurse in the Special Care Nursery Department at IU Health Bloomington) and has two children, a son, Carter, and daughter, Alexis.

#### REFERENCES

1. American Congress of Obstetricians and Gynecologists. Cesarean Section Rates in the United States. <http://www.acog.org>
2. Birkett C. Why C-Section Rates are Rising. FYI Living. 2011. <http://www.fyiliving.com/mental-health/relationships/parenting/why-c-section-rates-are-rising/>
3. C-section: Risks. Mayo Clinic Staff. 2010. <http://www.mayoclinic.com/health/c-section/MY00214/DSECTION=risks>
4. Caesarean Section – Topic Overview. Web MD. 2010. <http://www.webmd.com/baby/tc/caesarean-section-topic-overview>
5. Caesarean section. Wikipedia. [http://www.en.wikipedia.org/wiki/Caesarean\\_section](http://www.en.wikipedia.org/wiki/Caesarean_section)
6. DiLeo, GM, MD. Your C-Section: A Step-by-Step Guide. [http://www.babyzone.com/pregnancy/labor\\_birth/csection/article/Caesarean-section-guide](http://www.babyzone.com/pregnancy/labor_birth/csection/article/Caesarean-section-guide)
7. Kantor GS. Anesthesia Spinal vs Epidural for C-section. Net Wellness Consumer Health Information. 2001. <http://www.netwellness.org/question.cfm/22581.htm>



*Jade Ritter, CST, center, and the rest of the surgical team, stands with a proud mother and her daughter after a successful C-section*

8. Martin JA, MPH, et al. Births: Final Data for 2008. National Vital Statistics Report. 2008;59:1. [http://www.cdc.gov/nchs/data/nvsr/nvsr59/nvsr59\\_01.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr59/nvsr59_01.pdf)
9. Medicine: Woman's Ills. Time Magazine. 1951. Accessed April 1, 2009. <http://www.time.com/time/magazine/article/0,9171,815000,00.html>
10. Phillips N. Berry & Kohn's Operating Room Technique, Mosby Inc. 2004;10:694-696.
11. Rothrock JC. Alexander's Care of the Patient in Surgery, Mosby Inc. 13;464-465.
12. Screening for Syphilis Infection in Pregnancy Reaffirmation Recommendation Statement. US Preventive Services Task Force. 2009. <http://www.uspreventiveservicestaskforce.org/uspstf09/syphilis/syphpgrs.htm>
13. Sexually Transmitted Diseases: Syphilis – CDC Fact Sheet. Centers for Disease Control and Prevention. 2010. <http://www.cdc.gov/std/syphilis/std-fact-syphilis.htm>

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## CE REFRESHER

1. List the main structures of the female reproductive tract and list their functions.

- Ovaries \_\_\_\_\_  
\_\_\_\_\_
- Oviducts \_\_\_\_\_  
\_\_\_\_\_
- Uterus \_\_\_\_\_  
\_\_\_\_\_
- Vagina \_\_\_\_\_  
\_\_\_\_\_
- Vulva \_\_\_\_\_  
\_\_\_\_\_

2. List in the correct order the hormones produced during the menstrual cycle and their sources.

- FSH \_\_\_\_\_  
\_\_\_\_\_
- LH \_\_\_\_\_  
\_\_\_\_\_
- Estrogen \_\_\_\_\_  
\_\_\_\_\_
- Progesterone \_\_\_\_\_  
\_\_\_\_\_

3. Describe the functions of the predominant female sex hormones.

- Estrogen \_\_\_\_\_  
\_\_\_\_\_
- Progesterone \_\_\_\_\_  
\_\_\_\_\_

4. Describe fertilization and the early development of the ovum. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5. Describe the structure and function of the placenta. \_\_\_\_\_  
\_\_\_\_\_

6. Briefly describe the four stages of parturition.

- Contractions \_\_\_\_\_  
\_\_\_\_\_
- Fetal Delivery \_\_\_\_\_  
\_\_\_\_\_
- Afterbirth Delivery \_\_\_\_\_  
\_\_\_\_\_
- Hemostasis \_\_\_\_\_  
\_\_\_\_\_

*\*Page 166 and 167 are for the reader's benefit only. Please do not submit these pages to AST. The CE exam follows on 168.*



Write the meaning of each word element in the space provided.

Word Element	Definition
1. amni/o	
2. ante-	
3. -arche	
4. cephal/o	
5. cervic/o	
6. colp/o	
7. culd/o	
8. -cyesis	
9. dys-	
10. episo/o	
11. fet/o	
12. -gravida	
13. gynec/o	
14. hypo-	
15. hyper-	
16. hyster/o	
17. lact/o	
18. mamm/o	
19. mast/o	
20. men/o	
21. metr/o, metri/o	
22. micr/o	
23. multi-	
24. nat/o	
25. ne/o	
26. nulli-	
27. o/o	
28. obstetr/o	
29. olig/o	
30. omphal/o	