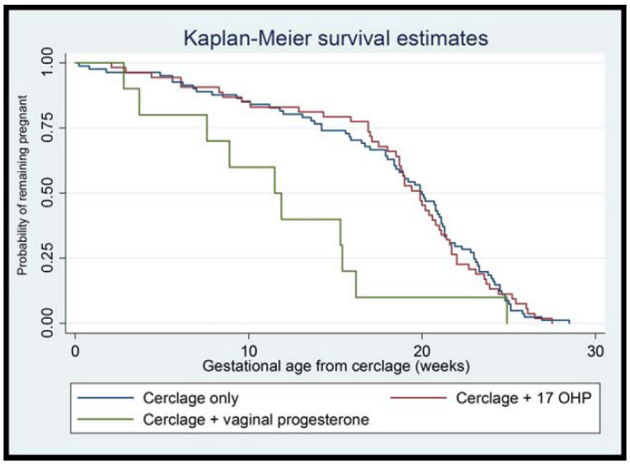
**RESULTS:** Of 144 women meeting inclusion criteria, 81 had C only, 53 had C + 17-OHP, and 10 had C + Vag P. Compared to C only, women with either type of P delivered at similar gestational ages (GA): 34.9 ± 5.89 vs. 33.8 ± 6.09 weeks, respectively; p = 0.27. There was no significant difference in GA at delivery between those with C only versus cerclage + 17-OHP: 34.9 ± 5.9 vs 34.4± 6.03 weeks, respectively; p=0.63. However, women with C + Vag P delivered earlier than women with C only: 30.59 ± 5.58 vs. 34.84 ± 5.91 weeks, respectively; p = 0.044. Women with C + Vag P had an adjusted OR for delivery < 35 weeks compared with C only of 5.09 (95% CI: 1.12 - 23.09). The KM plot demonstrates that women with C + Vag P are significantly more likely to deliver sooner than the other groups (Figure 1). Neonatal outcomes were not improved by C + any P (data not shown).

**CONCLUSION:** The study found that the use of C only or combined with any P did not prevent PTB <35 weeks or adverse neonatal outcomes. Women receiving C and Vag P are significantly more likely to deliver earlier possibly indicating a higher risk group that could benefit from further studies.




## 219 Trial of labor versus primary cesarean delivery in women with extreme obesity

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**OBJECTIVE:** It is unclear whether a trial of labor (TOL) is safe for women with extreme obesity intending vaginal delivery. The objective of this study is to assess maternal and neonatal outcomes among women with extreme obesity who undergo a primary CD versus a TOL.

**STUDY DESIGN:** This is a retrospective cohort study of all deliveries ≥36 weeks' gestation in the State of California between 2007-2011. Data were extracted from maternal discharge data linked to infant birth certificate records. Included were all women with a body mass index (BMI) ≥50. Excluded were multiple gestations and women undergoing a trial of labor (TOL) after CD or a repeat CD. The primary outcome was severe maternal mortality or death (SMMD). Our secondary outcome was a composite of neonatal morbidity or death.

**RESULTS:** Of the 1,115,876 women who underwent either a TOL or a primary CD, our cohort comprised 2,693 women (0.24%) with a BMI ≥ 50. In our cohort, 71% (1918) underwent a TOL and 29% (775) a primary CD. The overall CD rate was 39%, of which 15% underwent a TOL. Rates of maternal and neonatal morbidities are presented in Table. Compared to primary CD, women undergoing TOL had a reduced risk of SMMD (0.6% vs 1.4%, RR 0.40, 95% CI 0.28-0.81). Women undergoing CD after a TOL were at increased risk of SMMD compared to women undergoing vaginal delivery (1.7% vs 0.4%, RR 4.7, 95% CI 1.5-15.4), whereas the risks of SMMD were not significantly different between women undergoing CD after TOL vs. primary CD (1.7% vs 1.4%, RR 1.22, 95% CI 0.43-3.50). NICU admission was significantly reduced among women with a TOL but there were no differences in the overall rate of neonatal morbidity compared to women with a primary CD. A successful TOL was associated positively with parity and negatively with maternal age and hypertensive disorders.

**CONCLUSION:** Among women with extreme obesity, a TOL and primary CD have similar associated morbidities Primary CD does not appear to reduce these morbidities.

Table 1: Maternal and neonatal outcomes

| | Trial of Labor N=1918 | Primary Cesarean Delivery N=775 | RR (95%CI) | P value |
|---|---|---|---|---|
| Maternal death | 0 | 0 | n/a | n/a |
| Severe maternal morbidity* | 11 (0.57) | 11 (1.42) | 0.40 (0.18-0.93) | 0.02 |
| Blood transfusion | 15 (0.78) | 10 (1.29) | 0.61 (0.27-1.34) | 0.21 |
| Pulmonary embolism | 0 (0.00) | 2 (0.26) | 0.14 (0.01-1.30) | 0.08 |
| Mechanical ventilation | 1 (0.05) | 2 (0.66) | 0.20 (0.02-2.22) | 0.20 |
| Sepsis | 3 (0.16) | 0 (0.00) | 1.62 (0.18-14.5) | 0.56 |
| Neonatal death | 1 (0.05) | 2 (0.26) | 0.02 (0.02-2.22) | 0.21 |
| Neonatal morbidity | 17 (0.89) | 12 (1.55) | 0.57 (0.28-1.19) | 0.13 |
| NICU admission | 13 (0.68) | 12 (1.55) | 0.44 (0.20-0.96) | 0.03 |
| Birth Injury | 1 (0.05) | 0 (0.00) | 0.81 (0.07-8.91) | 0.53 |
| Ventilation | 5 (0.26) | 0 (0.00) | 2.42 (0.29-10.1) | 0.33 |
| Seizure | 0 (0.00) | 1 (0.13) | 0.20 (0.01-2.22) | 0.28 |

All numbers are N (%) or mean ± standard deviation

*Severe Maternal Morbidity was examined using the methods described by Kuklina[1] et al and Callaghan[2] and defined by ICD-9 or birth certificate codes if the length of stay for the delivery hospitalization was >90th percentile for the route of delivery and if any of the following occurred: postpartum hemorrhage, maternal sepsis, deep vein thrombosis, pulmonary embolism, uterine rupture, respiratory failure, heart failure, puerperal cerebral vascular accident, severe anesthetic complication, maternal shock, disseminated intravascular coagulation, or renal failure. SMM also was de signated as occurring regardless of length of stay if ICD-9 or birth certificate codes indicated any of the following: hysterectomy, ventilation, unplanned return to operating room, transfer to the intensive care unit, or maternal death.

1. Kuklina EV, Meikle SF, Jamieson DJ, Whiteman MK, Barfield WD, Hillis SD, et al. Severe obstetric morbidity in the United States: 1998-2005. Obstetrics and Gynecology 2009;113:293-9.
2. Callaghan WM, MacKay AP, Berg CJ. Identification of severe maternal morbidity during delivery hospitalizations, United States, 1991-2003. American J of Obstetrics and Gynecology 2008;199:133.e1-.e8.

## 220 Primary Cesarean Delivery in Obese Women

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**OBJECTIVE:** Data are limited regarding contributors for the increase in cesarean delivery (CD) in obese women. We investigated the indications for primary CD by body mass index kg/m$^2$ (BMI) category.

**STUDY DESIGN:** In the Consortium of Safe Labor study (2002-2008), we calculated indications for primary CD including multiple gestation, malpresentation, elective, macrosomia, placenta previa or vasa previa, fetal indication, human immunodeficiency virus (HIV) or active herpes simplex virus (HSV), uterine scar, nonreassuring fetal heart tracing (NRFHT), chorioamnionitis, placental abruption, hypertensive disease (HTN), failure to progress or cephalopelvic disproportion (FTP or CPD), failed induction, and failed operative delivery. We

excluded previous CD, antepartum stillbirth, congenital anomaly, and BMI <18.5. Women were categorized according to BMI: normal weight (18.5-24.9), overweight (25.0-29.9), obese category I (30.0-34.9), category II (35.0-39.9), and category III (≥40). Chi-square and Cochran-Armitage Trend Test were used to compare indications. P-value (P) <.01 was considered as significant.

**RESULTS:** Of 66,502 nulliparas and 76,961 multiparas, 19,431 nulliparas (29.2%) and 7,329 multiparas (9.5%) underwent primary CD. In nulliparas, higher BMI was associated with increased rates of primary CD for elective, macrosomia, fetal indication, NRFHT, chorioamnionitis, HTN, FTP or CPD, and failed induction (P<.01 for all) but not for malpresentation (P=.02), multiple gestation (P=.03), HIV or active HSV (P=.70), uterine scar (P=.02), placental abruption (P=.05), and failed operative delivery (P=.27) (Figure 1). In multiparas, higher BMI was associated with increased rates of primary CD for malpresentation, elective, multiple gestation, macrosomia, fetal indication, NRFHT, HTN, FTP or CPD, and failed induction (P<.01 for all) but not for HIV or active HSV (P=.31), uterine scar (P=.07), chorioamnionitis (P=.06), placental abruption (P=.14), and failed operative delivery (P=.91) (Figure 2). Higher BMI was associated with decreased rate of primary CD for placenta previa or vasa previa regardless of parity (P<.01).

**CONCLUSION:** NRFHT and FTP or CPD were major contributors for the increased primary CD rates in obese women. Further evaluation is needed to attempt to reduce the CD rate.

Figure 1. Indications for primary cesarean delivery in nulliparas.

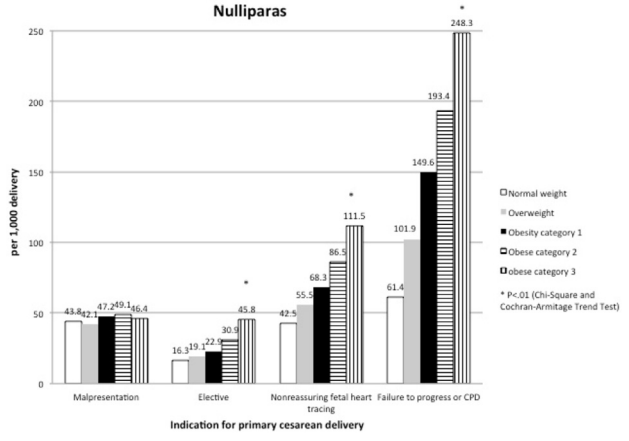
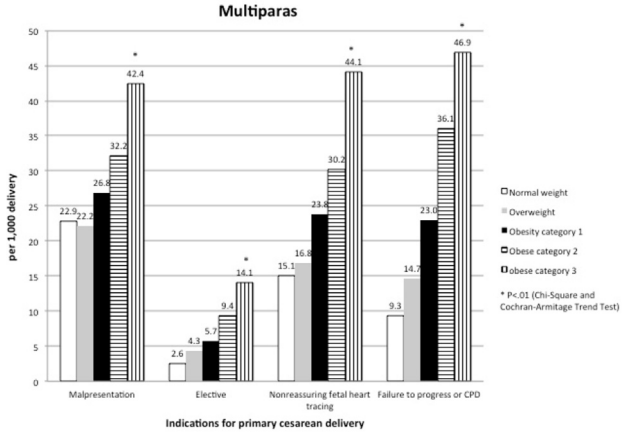



Figure 2. Indications for primary cesarean delivery in multiparas.




## 221 Maternal obesity and acute neonatal morbidity after cesarean delivery

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**OBJECTIVE:** To describe the association between maternal obesity and acute neonatal morbidity among neonates delivered via cesarean delivery (CD), and to estimate this association in women with Class III obesity.

**STUDY DESIGN:** A secondary cohort analysis of the MFMU Cesarean Registry stratified by maternal body mass index (BMI) at delivery, as non-obese (BMI 18.5-29.9), non-Class III obese (BMI 30-39.9) and Class III obese (BMI ≥ 40). Our primary outcome was defined as having one or more acute peripartum neonatal morbidities, including 5 min Apgar < 5, CPR or ventilator support within 24 hours of delivery, and neonatal injury (brachial plexus injury, fracture, facial nerve injury, skin laceration). Additional analyses assessed each outcome separately, including NICU admission and cord gas pH <7.1. We conducted a subgroup analysis of Class III obese women and defined BMI as 40-49.9, 50-59.9, and BMI ≥ 60. We compared maternal, neonatal and operative characteristics using $\chi 2$ analysis. Logistic regression models were used to estimate odds of acute neonatal morbidity among all pregnancies and for term pregnancies only (≥37 weeks) for each maternal BMI stratum. Models were adjusted for age, race, number of prior CD, CD after labor, birth weight, hemoglobin, cesarean indication, anesthesia, uterine and skin incision.

**RESULTS:** Of 49493 women-neonate dyads delivered via CD, 38% of women (n=18,786) were non-obese, 47% (n=23,279) were non-Class III obese and 15% (n=7428) were Class III obese. Among Class III obese women, 82% (n=6108) had BMI 40-49.9; 15% (n=1089) had BMI 50-59.9, and 3% (n=222) had BMI ≥ 60. With higher maternal BMI, unadjusted risk of NICU admission (p<.0001) and cord gas pH <7.1 (p<.0001) were higher. Class III obesity was associated with increased odds of acute neonatal morbidity (Table). Associations appeared similar whether or not we restricted to term deliveries, but were more consistently significant among term deliveries.

**CONCLUSION:** Maternal class III obesity is associated with higher odds of severe acute neonatal morbidity after CD. This information is important for maternal counseling and may guide in developing interventional studies aimed at decreasing neonatal morbidity among obese patients.

Maternal obesity and acute neonatal morbidity at time of cesarean

| | All Deliveries (n=49493) | | | Term Deliveries (n=41262) | | |
|---|---|---|---|---|---|---|
| | Severe acute morbidity n (%) | Crude OR (95% CI) | Adjusted OR (95% CI) | Severe acute morbidity n (%) | Crude OR (95% CI) | Adjusted OR (95% CI) |
| Non-obese (BMI 18.5-29.9) | 1665 (8.9) | 1 (ref) | 1 (ref) | 323 (2.2) | 1 (ref) | 1 (ref) |
| Non-Class III obese (BMI 30-39.9) | 1407 (6.0) | 0.66 (0.61,0.71) | 0.99 (0.91, 1.98) | 480 (2.4) | 1.10 (0.96, 1.27) | 1.11 (0.95, 1.30 |
| Class III obese (BMI ≥ 40) | 518 (7.0) | 0.77 (0.70,0.85) | 1.21 (0.07,1.37) | 187 (3.0) | 1.38 (1.15, 1.65) | 1.35 (1.10, 1.65) |
| BMI 40-49.9 | 431 (7.1) | 0.78 (0.70, 0.87) | 1.24 (1.09, 1.41) | 151 (2.9) | 1.35 (1.10,1.64) | 1.33 (1.07, 1.65) |
| BMI 50-59.9 | 75 (6.8) | 0.75 (0.59, 0.96) | 1.25 (0.95, 1.66) | 32 (3.5) | 1.61 (1.12, 2.33) | 1.54 (1.04, 2.28) |
| BMI≥ 60 | 12 (5.4) | 0.59 (0.33, 1.05) | 0.55 (0.28,1.10) | 4 (2.2) | 1.01 (0.33, 2.73) | 0.74 (0.23, 2.35) |

## 222 Development of a prediction model for cesarean-associated blood transfusion

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**OBJECTIVE:** To develop a model based on factors available at the time of cesarean delivery to predict risk of red blood cell transfusion in the intraoperative or postoperative period.