SEPTEMBER 2022 ■ Volume 227, Number 3

SPECIAL REPORT

375 Percutaneous/mini-laparotomy fetoscopic repair of open spina bifida: a novel surgical technique

Ramen H. Chmait; Martha A. Monson; Huyen Q. Pham; Jason K. Chu; Alexander Van Speybroeck; Andrew H. Chon; Eftichia V. Kontopoulos; Ruben A. Quintero

Percutaneous/mini-laparotomy—a modified fetoscopic technique for the antenatal repair of open spina bifida—draws on the benefits and minimizes the risks of both the laparotomy-assisted and the percutaneous surgical approaches.

EXPERT REVIEWS

384 New insights into the etiopathology of placenta accreta spectrum

Eric Jauniaux; Davor Jurkovic; Ahmed M. Hussein; Graham J. Burton

Accreta placentation is not excessively invasive but is secondary to uterine scarification, which leads to major changes in vascularization and anatomy of the uteroplacental interface.

392 Maternal obesity during pregnancy leads to derangements in one-carbon metabolism and the gut microbiota: implications for fetal development and offspring wellbeing

Eleonora Rubini; Nicole Schenkelars; Melek Rousian; Kevin D. Sinclair; Lieske Wekema; Marijke M. Faas; Régine P. M. Steegers-Theunissen; Sam Schoenmakers

The maternal supply of essential B vitamins to the fetus depends on one-carbon metabolism and the gut microbiota. Obesity in pregnancy disrupts B vitamin availability due to one-carbon metabolism derangements and gut dysbiosis, therefore is a severe risk factor for fetal and offspring health.

SYSTEMATIC REVIEWS

401 Androgens and diminished ovarian reserve: the long road from basic science to clinical implementation. A comprehensive and systematic review with meta-analysis

Ana Raquel Neves; Pedro Montoya-Botero; Nikolaos P. Polyzos

Testosterone priming seems to have a potential beneficial effect on ovarian response and reproductive outcomes in diminished ovarian reserve and poor ovarian response patients.

(continued)
Long-term health outcomes of children born to mothers with hyperemesis gravidarum: a systematic review and meta-analysis
Kelly Nijsten; Larissa A. W. Jansen; Jacqueline Limpens; Martijn J. J. Finken; Marjette H. Koot; Iris J. Grooten; Tessa J. Roseboom; Rebecca C. Painter

Hyperemesis gravidarum is associated with a small increase in adverse long-term health effects in offspring, including neurodevelopmental disorders, mental health disorders, and testicular cancer.

Fetal reduction of triplet pregnancies to twins vs singletons: a meta-analysis of survival and pregnancy outcome
Kamran Hessami; Mark I. Evans; Ahmed A. Nassr; Jimmy Espinoza; Roopali V. Donepudi; Magdalena Sanz Cortes; Eyal Krispin; Shayan Mostafaei; Michael A. Belfort; Alireza A. Shamshirsaz

Triplet pregnancies reduced to twin pregnancies had a lower rate of fetal survival, lower gestational age at birth, higher risk of preterm birth, and lower birthweight than triplet pregnancies reduced to singleton pregnancies.

Does vaginal progesterone prevent recurrent preterm birth in women with a singleton gestation and a history of spontaneous preterm birth? Evidence from a systematic review and meta-analysis
Agustin Conde-Agudelo; Roberto Romero

There is no convincing evidence supporting the use of vaginal progesterone to prevent recurrent preterm birth in singleton gestations with a history of spontaneous preterm birth.

The amniotic fluid index and oligohydramnios: a deeper dive into the shallow end
Joseph R. Wax; Michael G. Pinette

The amniotic fluid index should be considered a reasonable method for third-trimester amniotic fluid assessment and diagnosing oligohydramnios.

Cost-effectiveness of prophylactic retropubic sling at the time of vaginal prolapse surgery
Tsung Mou; Lauren A. Cadish; Elizabeth L. Gray; C. Emi Bretschneider
Prophylactic selective sling placement guided by prolapse-reduced cough stress test is the preferred and cost-effective strategy in vaginal prolapse surgeries to address de novo stress urinary incontinence.

CO₂ surgical laser for treatment of stress urinary incontinence in women: a randomized controlled trial
James W. Alexander; Paivi Karjalainen; Lin Li Ow; Mugdha Kulkarni; Joseph K. Lee; Teemu Karjalainen; Alison Leitch; Germana Ryan; Anna Rosamilia

CO₂ laser treatment does not show a benefit compared with sham therapy for treating female stress urinary incontinence.

The online issue is FREE with your print subscription. Register at ajog.org/onlineaccess/.
Update on incidence of inpatient tubal ligation and long-acting reversible contraception in the United States
Nancy Z. Fang; Carolyn L. Westhoff
Recent rates of inpatient long-acting reversible contraception and tubal ligation procedures are reported.

Embryo morphologic quality in relation to the metabolic and cognitive development of singletons conceived by in vitro fertilization and intracytoplasmic sperm injection: a matched cohort study
Chun-Xi Zhang; Jing-Lei Xue; Wei Zhao; Yi-Qing Wu; Xin-Yi Liu; Si-Wen Wang; Ling-Hui Li; Si-Meng Gu; Jia-Qun Li; Yan-Ye Zhang; Fang-Hong Zhang; Ying-Zhi Yang; Yue-Mei Wang; Yi-Min Zhu; Lan-Feng Xing; Yu-Li Qian; Dan Zhang
Embryo morphologic quality was not associated with metabolic or cognitive development among 4- to 6-year-old singletons conceived by in vitro fertilization and intracytoplasmic sperm injection.

Medicaid expansion and 2-year survival in women with gynecologic cancer: a difference-in-difference analysis
Sarah P. Huepenbecker; Shuangshuang Fu; Charlotte C. Sun; Hui Zhao; Kristin M. Primm; Sharon H. Giordano; Larissa A. Meyer
Medicaid expansion was associated with improved 2-year survival for women with ovarian cancer in a difference-in-difference analysis of the National Cancer Database.

Attempts to conceive and the COVID-19 pandemic: data from the Apple Women’s Health Study
Victoria Fruh; Genevieve Lyons; Ariel L. Scalise; Nicola J. Gallagher; Anne-Marie Jukic; Donna D. Baird; Uvika Chaturvedi; Sanaa Suharwardy; Jukka-Pekka Onnela; Michelle A. Williams; Russ Hauser; Brent A. Coull; Shruthi Mahalingaiah
Study results suggested reduced odds of attempting conception until March 2021 of the COVID-19 pandemic among US study participants, particularly among women of lower educational levels.

Boosting maternal and neonatal humoral immunity following SARS-CoV-2 infection using a single messenger RNA vaccine dose
Lea Nevo; Adva Cahen-Peretz; Olesya Vorontsov; Rachelli Frenkel; Maor Kabessa; Sarah M. Cohen; Adar Hamrani; Esther Oiknine-Djian; Michal Lipschuetz; Debra Goldman-Wohl; Asnat Walfisch; Michal Kovo; Michal Neeman; Simcha Yagel; Dana G. Wolf; Ofer Beharier
A single dose of mRNA vaccine postinfection significantly boosts maternal and neonatal humoral immunity beyond that of convalescent and infection-naïve, fully-vaccinated parturients.

(continued)
Effects of prenatal exposure to maternal COVID-19 and perinatal care on neonatal outcome: results from the INTERCOVID Multinational Cohort Study

Francesca Giuliani; Daniel Oros; Robert B. Gunier; Sonia Deantoni; Stephen Rauch; Roberto Casale; Ricardo Nieto; Enrico Bertino; Albertina Rego; Camilla Menis; Michael G. Gravetti; Massimo Candiani; Philippe Deruelle; Perla K. García-May; Mohak Mhatre; Mustapha Ado Usman; Sherief Abd-Elsalam; Saturday Etuk; Raffaele Napolitano; Becky Liu; Federico Prefumo; Valeria Savasi; Marynea Silva Do Vale; Eric Baafi; Shabina Ariff; Nerea Maiz; Muhammad Baffah Aminu; Jorge Arturo Cardona-Perez; Rachel Craik; Gabriela Tavchioska; Babagana Bako; Caroline Benski; Fatimah Hassan-Hanga; Mónica Savorani; Loïc Sentilhes; Maria Carola Capelli; Ken Takahashi; Carmen Vecchiarelli; Satoru Ikenoue; Ramachandran Thiruvengadam; Constanza P. Soto Conti; Irene Cetin; Vincent Bizor Nachinab; Ernawati Ernawati; Eduardo A. Duro; Alexey Kholin; Jagiit Singh Teji; Sarah Rae Easter; Laurent J. Salomon; Adejumoke Idowu Ayede; Rosa Maria Cerbo; Josephine Agyeman-Duah; Paola Roggero; Brenda Eskenazi; Ana Langer; Zulfiqar A. Bhutta; Stephen H. Kennedy; Aris T. Papageorghiou; Jose Villar

Patients with COVID-19 diagnosis in pregnancy and the postnatal period are at substantial risk of neonatal morbidity and mortality compared with unexposed counterparts, with the most severe effects observed in test-positive neonates born to women with COVID-19 diagnosis.

Increase in preterm stillbirths in association with reduction in iatrogenic preterm births during COVID-19 lockdown in Australia: a multicenter cohort study

Lisa Hui; Melvin Barrientos Marzan; Stephanie Potenza; Daniel R. Rolnik; Natasha Pritchard; Joanne M. Said; Kirsten R. Palmer; Clare L. Whitehead; Penelope M. Sheehan; Jolyon Ford; Ben W. Mol; Susan P. Walker

Preterm stillbirths increased, whereas iatrogenic preterm births for fetal compromise decreased during the Melbourne COVID-19 lockdown.

Preserved recognition of Omicron spike following COVID-19 messenger RNA vaccination in pregnancy

Yannic C. Bartsch; Caroline Atyeo; Jaewon Kang; Yongfei Cai; Bing Chen; Kathryn J. Gray; Andrea G. Edlow; Galit Alter

Antibody binding to SARS-CoV-2 Omicron spike is preserved and can leverage antiviral immunity in pregnant individuals.

Maternal and neonatal outcomes of pregnancies with COVID-19 after medically assisted reproduction: results from the prospective COVID-19-Related Obstetrical and Neonatal Outcome Study

Yvonne Ziert; Michael Abou-Dakak; Clara Backes; Constanze Banz-Jansen; Nina Bock; Michael Bohlmann; Charlotte Engelbrecht; Teresa Mia Gruber; Antonella Iannaccone; Magdalena Jeges; Corinna Keil; Ioannis Kyvernitakis; Katharina Lang; Angela Lihs; Jula Manz; Christine Morfeld; Manuela Richter; Gregor Seliger; Marina Sourouni; Constantin Sylvius von Kaisenberg; Silke Wegener; Ulrich Pecks; Frauke von Versen-Höynck; On behalf of the COVID-19-Related Obstetric and Neonatal Outcome Study (CRONOS) Network

Medically assisted reproduction is not an additional risk factor for adverse pregnancy outcomes in women with COVID-19.
ORIGINAL RESEARCH (continued)

497 Placental protein levels in maternal serum are associated with adverse pregnancy outcomes in nulliparous patients
Samuel Parry; Benjamin A. Carper; William A. Grobman; Ronald J. Wapner; Judith H. Chung; David M. Haas; Brian Mercer; Robert M. Silver; Hyagriv N. Simhan; George R. Saade; Uma M. Reddy; Corette B. Parker; On behalf of the Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-to-Be Group
Early pregnancy maternal serum levels of proteins that affect placental angiogenesis, implantation, and development were associated with subsequent adverse pregnancy outcomes in nulliparous gravidas.

500 Screening for spontaneous preterm birth by cervical length and shear-wave elastography in the first trimester of pregnancy
Qiaoli Feng; Piya Chaemsaithong; Honglei Duan; Xiaoning Ju; Kubi Appiah; Lixia Shen; Xueqin Wang; Yiyun Tai; Tak Yeung Leung; Liona C. Poon
A short cervix and a soft cervix identified in the first trimester of pregnancy are associated with an increased risk for spontaneous preterm delivery.

502 The heart after surviving twin-to-twin transfusion syndrome
Ximena Torres; Mar Bennasar; Carles Bautista-Rodriguez; Raigam J. Martinez-Portilla; Olga Gomez; Talita Micheletti; Elisenda Eixarch; Fatima Crispí; Eduard Gratacos; Josep M. Martinez
Cardiovascular remodeling occurs in recipients and donors before fetal surgery, and many changes persist in postnatal life.

504 Selective vs complete fetoscopic coagulation of vascular equator: a matched comparative study
Raphael Bartin; Claire Colmant; Nicolas Bourgon; Aude Carrier; Yves Ville; Julien Stirnemann
The Solomon technique reduces the risk of postoperative twin anemia polycythemia syndrome and improves perinatal survival but increases the risk of early preterm rupture of membranes and associated neonatal morbidity.

506 Antenatal intravenous immunoglobulins in pregnancies at risk of fetal and neonatal alloimmune thrombocytopenia: comparison of neonatal outcome in treated and nontreated pregnancies
Siw L. Ernstsen; Maria T. Ahlen; Tiril Johansen; Eirin L. Bertelsen; Jens Kjeldsen-Kragh; Heidi Tiller
Refusing from antenatal intravenous immunoglobulins treatment did not increase the risk of intracranial hemorrhage in low-risk pregnancies.

Celeste J. Romano; Clinton Hall; Anna T. Bukowski; Gia R. Gumbs; Ava Marie S. Conlin
Pregnancy-associated and pregnancy-related deaths varied over time and by age and race and ethnicity; suicide and overdose are emerging causes, particularly among young, non-Hispanic White service members.

(continued)
**ORIGINAL RESEARCH (continued)**

**511 Natural language processing of admission notes to predict severe maternal morbidity during the delivery encounter**

Mark A. Clapp; Ellen Kim; Kaitlyn E. James; Roy H. Perlis; Anjali J. Kaimal; Thomas H. McCoy Jr

Natural language processing of provider admission notes can assist in stratifying the risk of severe maternal morbidity during the delivery encounter.

**MEETING PAPERS**

**SELECTED PAPERS FROM THE 42ND ANNUAL MEETING (THE PREGNANCY MEETING) OF THE SOCIETY FOR MATERNAL-FETAL MEDICINE**

**513 Severity of intrapartum fever and neonatal outcomes**

Drew Hensel; Fan Zhang; Ebony B. Carter; Antonina I. Frolova; Anthony O. Odibo; Jeannie C. Kelly; Alison G. Cahill; Nandini Raghuraman

Risk of composite neonatal morbidity correlates with intrapartum fever severity and is independent of the interval between reaching maximum intrapartum temperature and delivery.

**515 Liver stiffness and steatosis in preeclampsia as shown by transient elastography—a prospective cohort study**

Michal Carmiel Haggai; Inshirah Sgayer; Jacob Bornstein; Marwan Odeh; Lior Lowenstein; Maya Frank Wolf

This study found elevated antepartum and postpartum liver stiffness and liver steatosis, as measured by transient elastography, in women with preeclampsia when compared with a control group.

**517 Beyond stillbirth: association of intrahepatic cholestasis of pregnancy severity and adverse outcomes**

Minhazur Sarker; Andres Ramirez Zamudio; Chelsea DeBolt; Lauren Ferrara

We conducted a retrospective cohort study to determine the association of intrahepatic cholestasis of pregnancy disease severity and adverse outcomes other than stillbirth.

**519 Clinical significance of umbilical artery intermittent vs persistent absent end-diastolic velocity in growth-restricted fetuses**

Katherine H. Bligard; Xinyuan Xu; Nandini Raghuraman; Jeffrey M. Dicke; Anthony O. Odibo; Antonina I. Frolova

Umbilical artery intermittent absent end-diastolic velocity in growth-restricted fetuses is associated with lower rates of progression to reversed end-diastolic velocity and later gestational age at delivery, leading to lower neonatal morbidity and death.

**521 Impact of implementation of the Maternal-Fetal Triage Index on patients presenting with severe hypertension**

Eva Hoffmann; Kristie Wilburn-Wren; Shena J. Dillon; Amarily Barahona; Donald D. McIntire; David B. Nelson

The implementation of the Maternal-Fetal Triage Index was associated with improved timeliness of assessment, magnesium sulfate initiation, and antihypertensive administration in women with severe hypertension.
IMAGES IN OBSTETRICS AND GYNECOLOGY

523 Zoon’s vulvitis in association with severe vulvodynia
Carlos Abril-Pérez; Rodolfo David Palacios-Diaz; Ignacio Torres-Navarro; Mercedes Rodríguez-Serna; Rafael Botella-Estrada

524 Imperforate hymen associated with constipation and acute urinary retention
Nikki S. O’Neill; Christine Isaacs

526 Spotting the target: clinical clues in the diagnosis of disseminated Lyme disease in pregnancy
Bethany Cucka; Stella X. Chen; Bianca Biglione; Daniela Kroshinsky
A 33-year-old G2P1 female presented with headache and multiple erythema migrans on the trunk and extremities consistent with disseminated Lyme disease with neurological involvement.

528 Ultrasound differential diagnosis between amniotic fluid sludge and blood clot from placental edge separation
Agata Kantorowska; Nadia N. B. Kunzier; Jennifer J. M. Kidd; Anthony M. Vintzileos

531 A case of prenatal strangulated inguinal hernia
Luisa Cariello; Elisa Montaguti; Gianluigi Pilu

533 Placenta previa and bladder varicosities—a clinical conundrum
Chelsie Warshafsky; Brigitte Corran; Inbal Willner; Jeff Warren; Sukhbir Sony Singh

RESEARCH LETTERS

535 Migraine and adverse pregnancy outcomes: the Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-to-be
Eliza C. Miller; Kristi Chau; Gular Mammadli; Lisa D. Levine; William A. Grobman; Ronald Wapner; Natalie A. Bello

537 Validating a calculator without race and ethnicity to predict vaginal birth after cesarean delivery
Shunya Sugai; Koji Nishijima

538 The association of obesity with type I uterine cancer—is this an oversimplification?
Courtney M. Eakin; Cheng-I Liao; Ritu Salani; Joshua G. Cohen; Daniel S. Kapp; John K. Chan

539 Cell-free DNA analysis for noninvasive examination of trisomy: comparing 2 targeted methods
Stéphanie Conotte; Hanane El Kenz; Jérôme De Marchin; Jacques C. Jani

541 Factors associated with SARS-CoV-2 transplacental transmission
Alexandre J. Vivanti; Christelle Vauloup-Fellous; Guillaume Escourrou; Jonathan Rosenblatt; Jean-Marie Jouannic; Astrid Laurent-Bellue; Daniele De Luca

(continued)
RESEARCH LETTERS (continued)

544 Buprenorphine uptake during pregnancy following the 2017 guidelines update on prenatal opioid use disorder
Max Jordan Nguemeni Tiako; Angelica Meinhofer; Ari Friedman; Eugenia C. South; Rachel L. Epstein; Zachary F. Meisel; Jake R. Morgan

546 Oxytocin utilization for women undergoing an induction of labor by 1 kg/m² increase in body mass index
Brock E. Polnaszek; Justine Reilly; Christina A. Raker; Adam K. Lewkowitz; Valery A. Danilack

LETTERS TO THE EDITORS

548 Chorioamnionitis and risk of long-term neurodevelopmental impairment in offspring
Gui-Lan Chen; Dong-Zhi Li
Reply, page 549
Eleni Tsamantioti; Neda Razaz

550 Single fetal demise following fetoscopic ablation for twin-to-twin transfusion syndrome—cohort study, systematic review and meta-analysis: a comment
Xiyen He; Xiaotong Sun; Tao Qu
Reply, page 550
Hiba J. Mustafa; Katherine Goetzinger; Ozhan M. Turan

551 Leave no woman behind: a call to standardize and expand the Get With The Guidelines registry
Andrea D. Shields; Laurie Kavanagh; Jacqueline Battistelli
Reply, page 553
Merrill Thomas; Paul S. Chan

553 Does cesarean delivery on maternal request cause adverse outcomes?
Shi Wu Wen; Malia S. Q. Murphy; Mark Walker; Darine El-Chaâr
Reply, page 556
Marie-Julie Trahan; Haim A. Abenhaim

SOCIETY FOR MATERNAL-FETAL MEDICINE

B2 Society for Maternal-Fetal Medicine Special Statement: Quality metric for timely postpartum follow-up after severe hypertension
Society for Maternal-Fetal Medicine (SMFM); Kelly S. Gibson; C. Andrew Combs; Samuel Bauer; Rebecca Feldman Hamm; Andrew Healy; Jamie Morgan; Lorraine Toner; Amy Whitsell; Patient Safety and Quality Committee
In this statement, the Society for Maternal-Fetal Medicine proposes a uniform metric reflecting the rate of timely postpartum follow-up of patients with severe hypertension.
Cesarean scar ectopic pregnancy is a complication in which an early pregnancy implants in the scar from a prior cesarean delivery. This condition presents a substantial risk for severe maternal morbidity and mortality because of challenges in securing a prompt diagnosis.