

**Official Organ of the “International Fetal Medicine and Surgery Society”**

# **Fetal Diagnosis and Therapy**

## **Clinical and Research Advances**

Founded 1986 as “Fetal Therapy” by M. Michejda and K.C. Pringle  
Continued by M.I. Evans, W. Holzgreve, H. Nakano and S. Uzan

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López, M.; Gonçalves, A.; Meler, E.; Plaza, A.; Hernández, S.; Martínez-Portilla, R.J.; Cobo, T.; García, F.; Gómez Roig, M.D.; Gratacós, E.; Palacio, M.; Figueras, F. (Barcelona); on behalf of the COVID Collaborative Group

### Original Papers

### 529 Fractional Limb Volume in Spina Bifida Fetuses as an Assessment Tool for Postnatal Ambulation

Donepudi, R.; Huynh, M.; Johnson, A.; Austin, M.; Tsao, K.; Papanna, R.; Moise Jr., K.J. (Houston, TX)

### 536 Prognostic Factors of Successful Cervical Ripening and Labor Induction in Late-Onset Fetal Growth Restriction

Villalain, C.; Quezada, M.S.; Gómez-Arriaga, P.; Simón, E.; Gómez-Montes, E.; Galindo, A.; Herraiz, I. (Madrid)

### 545 Calculating Observed-to-Expected Total Fetal Lung Volume in CDH Fetuses in Twin Gestation: Is There a Better Way?

Kim, A.G.; Mon, R.A.; Karmakar, M.; Kreutzman, J.; Ladino-Torres, M.; Treadwell, M.C.; Mychaliska, G.B.; Perrone, E.E. (Ann Arbor, MI)

### 554 Exome Sequencing for Prenatal Detection of Genetic Abnormalities in Fetal Ultrasound Anomalies: An Economic Evaluation

Kodabuckus, S.S.; Quinlan-Jones, E.; McMullan, D.J. (Birmingham); Maher, E.R. (Cambridge); Hurles, M.E. (Hinxton); Barton, P.M.; Kilby, M.D. (Birmingham)

### 565 Unplanned Cesarean Delivery in the Second Stage of Labor Holds Higher Odds of Complications than in the First Stage, while Similar in Primiparas and Multiparas

Lipschuetz, M. (Jerusalem/Ramat-Gan); Guedalia, J. (Ramat-Gan); Cohen, S.M.; Lewkowicz, A.A.; Amsalem, H.; Karavani, G.; Yagel, S. (Jerusalem); Unger, R. (Ramat-Gan)

### 572 Percent Absent End-Diastolic Velocity in the Umbilical Artery and Donor Twin Demise after Laser Surgery for Twin-Twin Transfusion Syndrome

Purnell, M.E.; Chon, A.H.; Korst, L.M.; Llanes, A.; Grubbs, B.H.; Chmait, R.H. (Los Angeles, CA)

### 580 Combination of “Markers” and the Consequent Importance of Fetal Abdominal Circumference in the First Trimester for Predicting Complications Specific to Monochorionic Twin Pregnancies

Radhakrishnan, P.; Thakar, S.; Chauhan, S.; Acharya, V.; Shettikeri, A. (Bangalore)

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### Original Papers

### 587 Neurodevelopmental Outcome in Infants with Lower Urinary Tract Obstruction Based on Different Degrees of Severity

Monteiro, S.; Nassr, A.A.; Yun, P.S.; Voigt, R.; Koh, C.J.; Roth, D.R.; Braun, M.; Angelo, J. (Houston, TX); Moscardo, I. (Houston, TX/Valencia); Espinoza, J.; Shamshirsaz, A.A.; Belfort, M. (Houston, TX); Ruano, R. (Rochester, NY); Sanz Cortes, M. (Houston, TX)

### 597 Monitored Anesthesia Care versus General Anesthesia for Intrauterine Fetal Interventions: Analysis of Conversions and Complications for 480 Cases

Patel, D.; Adler, A.C.; Hassanpour, A.; Olutoye, O.; Chandrakantan, A. (Houston, TX)

### 604 Prediction of Perinatal Mortality in Ebstein’s Anomaly Diagnosed in the Second Trimester of Pregnancy

Masoller, N.; Gómez del Rincón, O. (Barcelona); Herraiz, I.; Gómez-Montes, E. (Madrid); Soveral, I.; Pérez-Cruz, M. (Barcelona); Martínez-Bioscas, C.; Granados, M.A. (Madrid); Bennasar, M.; Escobar-Díaz, M.C. (Barcelona); Martínez, J.M. (Barcelona/Madrid); Galindo, A. (Madrid)

### 615 Short Femur in the Second Trimester Scan Is Related to Maternal Preeclampsia and Small for Gestational Age Newborns

Ventura, W. (Lima); Prieto-Sánchez, M.T.; Delgado, J.L.; Pertegal, M.; López, A.; Checa, R.; De Paco Matallana, C. (Murcia)

### 624 First-Trimester Prediction of Preterm Prelabour Rupture of Membranes

El-Achi, V.; de Vries, B. (Sydney, NSW); O’Brien, C. (Sydney, NSW/Townsville, QLD); Park, F.; Tooher, J.; Hyett, J. (Sydney, NSW)

### 630 Perinatal Outcomes in Fetuses Prenatally Diagnosed with Congenital Diaphragmatic Hernia and Concomitant Lung Lesions: A 10-Year Review

Soni, S.; Moldenhauer, J.S.; Rintoul, N.; Adzick, N.S.; Hedrick, H.L.; Khalek, N. (Philadelphia, PA)

### 636 Assessment of Fetal Lung Maturity Using Quantitative Ultrasound Analysis in Patients with Prelabor Rupture of Membranes

Flosi, E.B. (Niterói); da Silva, F.C.; de Jesús, G.R. (Rio de Janeiro); Velarde, L.G.C. (Niterói); de Sá, R.A.M. (Niterói/Rio de Janeiro)

### 642 Two’s Company: Multiple Thoracic Lesions on Prenatal US and MRI

Oliver, E.R.; DeBari, S.E.; Didier, R.A.; Johnson, A.M.; Khalek, N.; Peranteau, W.H.; Howell, L.J.; Adzick, N.S.; Coleman, B.G. (Philadelphia, PA)

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### Review

### 653 Acute Perinatal Infection and the Evidenced-Based Risk of Intrauterine Diagnostic Testing: A Structured Review

Wilson, R.D. (Calgary, AB)

### Original Papers

### 665 MicroRNA-148b-3p and MicroRNA-25-3p Are Overexpressed in Fetuses with Late-Onset Fetal Growth Restriction

Morales-Roselló, J.; García-Giménez, J.L.; Martínez Priego, L.; González-Rodríguez, D.; Mena-Mollá, S.; Maquieira Catalá, A.; Loscalzo, G.; Buongiorno, S.; Jakaite, V.; Cañada Martínez, A.J.; Perales Marín, A. (Valencia)

- 675 Contemporary Outcomes of Patients with Isolated Bilateral Renal Agenesis with and without Fetal Intervention**  
Riddle, S.; Habli, M.; Tabbah, S.; Lim, F.Y.; Minges, M.; Kingma, P.; Polzin, W. (Cincinnati, OH)
- 682 Fetoscopic Laser Ablation Therapy for Type II Vasa Previa**  
Chmait, R.H. (Los Angeles, CA); Catanzarite, V. (San Diego, CA); Chon, A.H.; Korst, L.M.; Llanes, A.; Ouzounian, J.G. (Los Angeles, CA)
- 689 Fetal Diagnosis and Therapy during the COVID-19 Pandemic: Guidance on Behalf of the International Fetal Medicine and Surgery Society**  
Deprest, J. (Leuven/London); Choolani, M. (Singapore); Chervenak, F. (New York, NY); Farmer, D. (Sacramento, CA); Lagrou, K. (Leuven); Lopriore, E. (Leiden); McCullough, L. (New York, NY); Olutoye, O. (Houston, TX); Simpson, L. (New York, NY); Van Mieghem, T.; Ryan, G. (Toronto, ON)
- 699 Atrial and Ventricular Deformation Analysis in Normal Fetal Hearts Using Two-Dimensional Speckle Tracking Echocardiography**  
Meister, M.; Axt-Fliedner, R. (Giessen); Graupner, O. (Munich); Kuhn, V.; Wolter, A.; Götte, M.; Enzensberger, C. (Giessen)
- Novel Insights from Clinical Practice
- 711 Noninvasive Fetal Electrocardiography in the Diagnosis of Long QT Syndrome: A Case Series**  
Sethi, N. (Washington, DC); Funamoto, K. (Miyagi); Ingbar, C.; Mass, P.; Moak, J. (Washington, DC); Wakai, R. (Madison, WI); Strasburger, J. (Milwaukee, WI); Donofrio, M. (Washington, DC); Khandoker, A. (Abu Dhabi); Kimura, Y. (Miyagi); Krishnan, A. (Washington, DC)
- 717 Refractory Fetal Supraventricular Tachycardia with Hydrops Successfully Converted by Intraperitoneal Flecainide in the Fetus: A Case Report**  
Vedel, C.; Vejlstrup, N.; Jensen, L.N.; Ekelund, C.K.; Nørgaard, L.N.; Harmse, L.; Petersen, O.B. (Copenhagen); Jaeggi, E. (Toronto, ON); Gembruch, U. (Bonn); Sundberg, K. (Copenhagen)

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### Research Articles

- 721 Feasibility, Reliability, and Agreement of Transperineal Ultrasound Measurement: Results from a Longitudinal Cohort Study**  
Kwan, A.H.W.; Chaemsathong, P.; Tse, W.T.; Appiah, K.; Chong, K.C.; Leung, T.Y.; Poon, L.C. (Hong Kong)
- 731 Fetal Cardiac Intervention for Pulmonary Atresia with Intact Ventricular Septum: International Fetal Cardiac Intervention Registry**  
Hogan, W.J. (San Francisco, CA); Grinenco, S. (Buenos Aires); Armstrong, A. (Columbus, OH); Devlieger, R. (Leuven); Dangel, J. (Warsaw); Ferrer, Q. (Barcelona); Frommelt, M. (Milwaukee, WI); Galindo, A. (Madrid); Gardiner, H. (Houston, TX); Gelehrter, S. (Ann Arbor, MI); Herberg, U. (Bonn); Howley, L. (Aurora, CO); Jaeggi, E. (Toronto, ON); Miranda, J. (Porto); Morris, S.A. (Houston, TX); Oepkes, D. (Leiden); Pedra, S. (São Paulo); Peterson, R. (St Louis, MO); Sholler, G. (Sydney, NSW); Simpson, J. (London); Strainic, J. (Cleveland, OH); Vigneswaran, T.V. (London); Wacker-Gussmann, A. (Munich); Moon-Grady, A.J. (San Francisco, CA)
- 740 Critical Coarctation of the Aorta in Selective Fetal Growth Restriction and the Role of Coronary Stent Implantation**  
Gijtenbeek, M.; Haak, M.C.; ten Harkel, A.D.J.; Bökenkamp, R. (Leiden); Eyskens, B.; Ortibus, E.; Meyns, B.; Gewillig, M.; Lewi, L. (Leuven)

- 749 Clinical and Economic Evaluation after Adopting Contingent Cell-Free DNA Screening for Fetal Trisomies in South Spain**  
Sainz, J.A. (Seville); Torres, M.R. (Huelva); Peral, I. (Seville); Granell, R. (Huelva); Vargas, M. (Seville); Carrasco, P. (Huelva); Garcia-Mejido, J.A. (Seville); Santacruz, B.; Gil, M.M. (Madrid)

- 757 Prescriptive Reference Standards of Third-Trimester Cerebroplacental Ratio and Its Physiological Determinants**  
Rial-Crestelo, M.; García-Otero, L.; Cancemi, A.; Giannone, M.; Escazzocchio, E.; Bierna, A.; Ferriols, E.; Hernandez, J.L. (Barcelona); Lubusky, M.; Kolarova, V. (Olomouc); Krofta, L.; Vojtěch, J. (Prague); Zohav, E. (Tel Aviv); Krajden, K. (Holon); Cruz-Martinez, R.; Cruz-Lemini, M. (Querétaro); Parra-Cordero, M.; Socias, P. (Santiago de Chile); Crispí, F.; Lopez, M.; Gratacós, E.; Figueras, F. (Barcelona)

- 765 Tetralogy of Fallot and Outlet Ventricular Septal Defect with Anterior Malalignment Detected at Early Fetal Echocardiography**  
De Robertis, V. (Bari); Persico, N.; Volpe, G. (Milan); Rembouskos, G. (Bari); Fabietti, I. (Milan); Olivieri, C.; Giudicepietro, A.; Volpe, P. (Bari)

- 772 Fetal Cardiac Remodeling Is Affected by the Type of Embryo Transfer in Pregnancies Conceived by in vitro Fertilization: A Prospective Cohort Study**  
Rizzo, G. (Rome/Moscow); Pietrolucci, M.E.; Mappa, I. (Rome); Bitsadze, V.; Khizroeva, J. (Rome/Moscow); Makatsariya, A. (Moscow); D'Antonio, F. (Chieti)

Novel Insights from Clinical Practice

- 779 Twin-Twin Transfusion Syndrome Complicated by Proximate Placental Cord Insertion Sites: Endoscopic Clip-Assisted Laser Occlusion**  
Chon, A.H. (Pasadena, CA); Pham, H.Q. (Pasadena, CA/Los Angeles, CA); Chmait, R.H. (Pasadena, CA)

Letter to the Editor

- 785 Response to "Contemporary Outcomes of Patients with Isolated Bilateral Renal Agenesis with and without Fetal Intervention" by RAFT Investigators**  
Jelin, E.B.; Atkinson, M.; Keiser, A. (Baltimore, MD); Blumenfeld, Y.J. (Palo Alto, CA); Baschat, A.A. (Baltimore, MD)

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### Research Articles

- 787 Intra-Amniotic Sildenafil Treatment Promotes Lung Growth and Attenuates Vascular Remodeling in an Experimental Model of Congenital Diaphragmatic Hernia**  
Okolo, F.; Zhang, G.; Rhodes, J.; Gittes, G.K.; Potoka, D.A. (Pittsburgh, PA)
- 800 Survival Outcomes by Fetal Weight Discordance after Laser Surgery for Twin-Twin Transfusion Syndrome Complicated by Donor Fetal Growth Restriction**  
Gabby, L.C.; Chon, A.H. (Los Angeles, CA); Korst, L.M. (North Hollywood, CA); Llanes, A.; Miller, D.A.; Chmait, R.H. (Los Angeles, CA)
- 810 Use of Remifentanil for Open in utero Fetal Myelomeningocele Repair Maintains Uterine Relaxation with Reduced Volatile Anesthetic Concentration**  
Marsh, B.J.; Sinskey, J.; Whitlock, E.L.; Ferschl, M.B. (San Francisco, CA); Rollins, M.D. (Rochester, MN)

- 817 Risk Factors for Co-Twin Fetal Demise following Radiofrequency Ablation in Multifetal Monochorionic Gestations**  
Gabby, L.C.; Chon, A.H. (Los Angeles, CA); Korst, L.M. (North Hollywood, CA); Llanes, A.; Chmait, R.H. (Los Angeles, CA)
- 824 Early Prophylactic Enoxaparin for the Prevention of Preeclampsia and Intrauterine Growth Restriction: A Randomized Trial**  
Llurba, E. (Barcelona/Madrid); Bella, M. (Barcelona); Burgos, J. (Madrid/Bilbao); Mazarico, E.; Gómez-Roig, M.D. (Madrid/Barcelona); De Diego, R. (Barcelona); Martínez-Astorquiza, T. (Madrid/Bilbao); Alijotas-Reig, J.; Sánchez-Durán, M.Á. (Barcelona); Sánchez, O. (Madrid); Carreras, E.; Cabero, L. (Madrid/Barcelona); Cabero, L. (Madrid/Barcelona)
- 834 Inter- and Intraobserver Agreement in First Trimester Ultrasound Evaluation of Placental Biometry**  
Trilla, C.; Medina, M.C.; Parra, J.; Llurba, E.; Espinós, J.J. (Barcelona)
- 841 First Trimester Screening for Common Trisomies and Microdeletion 22q11.2 Syndrome Using Cell-Free DNA: A Prospective Clinical Study**  
Kagan, K.O.; Hoopmann, M.; Pfaff, T.; Prodán, N.; Wagner, P. (Tübingen); Schmid, M. (San Jose, CA); Dufke, A.; Mau-Holzmann, U. (Tübingen); Brucker, S. (Tuebingen); Marcato, L.; Malvestiti, B.; Grati, F.R. (Busto Arsizio)
- 894 Alternative Hysterotomy Technique for the Reduction of Prenatal Complications of Intrauterine Myelomeningocele Repair**  
Olejek, A.; Horzelska, E.; Zamłyński, J.; Horzelski, T.; Zamłyński, M.; Nowak, L.; Pastuszka, A. (Bytom)
- 902 Initial Mechanistic Screening of Transamniotic Stem Cell Therapy in the Rodent Model of Spina Bifida: Host Bone Marrow and Paracrine Activity**  
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- 912 Surviving Lambs with Myelomeningocele Repaired in utero with Placental Mesenchymal Stromal Cells for 6 Months: A Pilot Study**  
Yamashiro, K.; Galganski, L.A.; Peyton, J.; Haynes, K.; Vicuna, V.; Kumar, P.; Keller, B.; Becker, J.; Pivetti, C.; Stokes, S.; Theodorou, C.; Jackson, J. (Sacramento, CA); Wang, A. (Sacramento, CA/Davis, CA); Farmer, D. (Sacramento, CA)
- 918 Minimizing Individual Learning Curves in a Mature Endoscopic Fetal Surgery Program**  
Akuchie, C.; Renaud, E.J.; Watson-Smith, D.; Carr, S.R.; Luks, F.I. (Providence, RI)

#### Review Article

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- IFMSS 2019**  
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Guest Editors: Meuli, M.; Zimmermann, R. (Zurich)
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Meuli, M.; Zimmermann, R. (Zurich)
- Meeting Report**
- 859 The IFMSS Tower Lecture: Fetal Surgery Past, Fetal Surgery Present, and Fetal Surgery Yet to Come!**  
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- 865 The Management of Myelomeningocele Study: Short-Term Neonatal Outcomes**  
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- 873 Prenatal Repair of Spina Bifida: A 2-Center Experience with Open Intrauterine Neurosurgery in Chile**  
Sepulveda, W. (Santiago); Corral, E. (Rancagua); Alcalde, J.L.; Otayza, F. (Santiago); Müller, J.M.; Ravera, F. (Rancagua); Devoto, J.C. (Santiago); Tapia, M. (Rancagua)
- 882 Urological Outcome after Fetal Spina Bifida Repair: Data from the Zurich Cohort**  
Mazzone, L.; Hölscher, A.C.; Moehrlen, U.; Gobet, R.; Meuli, M.; Horst, M. (Zurich)
- 889 Open Fetal Surgical Outcomes for Myelomeningocele Closure Stratified by Maternal Body Mass Index in a Large Single-Center Cohort**  
Moldenhauer, J.S.; Soni, S.; Jatres, J.; Gebb, J.; Khalek, N.; Paidas Teeffey, C.; Johnson, M.P.; Flake, A.W.; Hedrick, H.L.; Peranteau, W.H.; Heuer, G.G.; Adzick, N.S. (Philadelphia, PA)
- 927 Reconsidering ECMO in Premature Neonates**  
Wild, K.T.; Hedrick, H.L.; Rintoul, N.E. (Philadelphia, PA)
- Research Articles**
- 933 Outcomes of Airway Management in Micrognathia and Retrognathia Patients Born at Fetal versus Nonfetal Centers**  
Shahi, N.; Phillips, R.; Meier, M.; Grover, T.; Galan, H.; Zaretsky, M.; Meyers, M.; Kelley, P.; Marwan, A.I. (Aurora, CO)
- 939 A Rabbit Model for Optimization of Amniotic Fluid Components in the EXTrauterine Environment for Newborn Development (EXTEND) System**  
Baumgarten, H.D.; Hartman, H.A.; Butt, Z.; Ozawa, K.; Rossidis, A.C.; Lawrence, K.M.; Kim, A.G.; Davey, M.; Flake, A.W. (Philadelphia, PA)
- 947 Long-Term Outcome of Monochorionic Twins after Fetoscopic Laser Therapy Compared to Matched Dichorionic Twins**  
Rüegg, L. (Zurich City); Hüslér, M.; Krähenmann, F.; Zimmermann, R. (Zurich City); Natalucci, G. (Zurich); Ochsenbein-Köble, N. (Zurich City)
- 955 Fetal Non-Ovarian Abdominopelvic Cystic Lesions: A Single-Center Report**  
Eyerly-Webb, S.A.; Joshi, S.; Dion, E.; Snowise, S. (Minneapolis, MN); Lillegard, J. (Minneapolis, MN/Rochester, MN); Feltis, B.A. (Minneapolis, MN)
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- 960 Developing an Infrastructure for Bereavement Outreach in a Maternal-Fetal Care Center**  
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