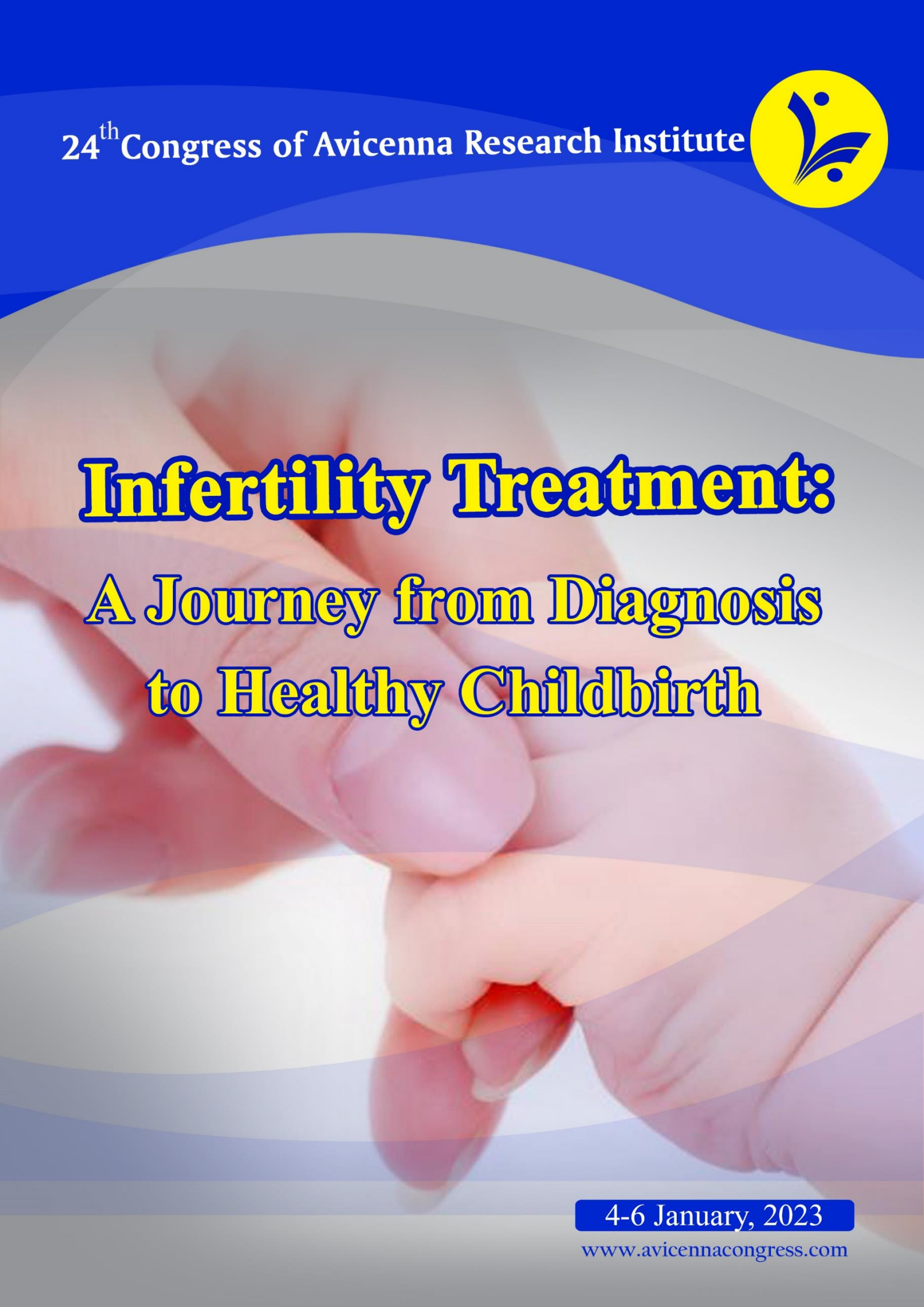
24th Congress of Avicenna Research Institute



Infertility Treatment:

A Journey from Diagnosis to Healthy Childbirth

4-6 January, 2023

www.avicennacongress.com

In the Name of God

24th Congress of

Infertility Treatment: A Journey from Diagnosis to Healthy Childbirth

(4-6 January, 2023)

Contents

The authors will bear full responsibility for the accuracy of their English abstracts

A Message from Congress President

As God bestowed the power upon our team to hold the forthcoming congress, we are once again proud to host honorable scientists and researchers in the "**Infertility Treatment: A Journey from Diagnosis to Healthy Childbirth**" congress.

Reproductive sciences and technologies are one of the most dynamic branches of biological and medical sciences in the world, and we constantly witness the latest achievements of researchers and scientists in this field. As the cutting-edge technologies are expediting the progress in infertility treatment, Avicenna Research Institute (ARI) outlines its chief mission by creating an opportunity to update the knowledge of stakeholders and set the ground for experts' exchange of knowledge in infertility treatment area. We can rest assured that vibrant and vigorous cooperation of researchers, experts and scientists will further our goals and promote the scientific status of diagnosis and treatment at the regional and global level.

Hence, Avicenna Research Institute welcomes professors, physicians, and students in person and virtually from 4-6 January, 2023 who will definitely make the congress a thriving event. Therefore, after years of interruption in holding the Congress in physical format due to COVID-19 restrictions in the community, the opportunity is now provided to establish the event in a suitable, calming, and relaxing environment which will be a great chance for you to meet your colleagues and discuss the world scientific and technological issues in the realm of infertility treatment.

Last but not least, while acknowledging the hard work of all those involved in previous congresses, it has been tried to take into consideration the shortcomings and suggestions of previous participants to override the challenges with incredible unceasing efforts for establishing a novel collaborative congress this year. Therefore, your valuable comments as an ancillary aid in holding the congress as productively as possible are kindly welcomed and we hope that with the efforts of the scientific and executive committee as well as the presence, participation, and interaction of our respected professors, a worthy and fruitful international scientific gathering would be established.

Mohammad Reza Sadeghi
Chairman

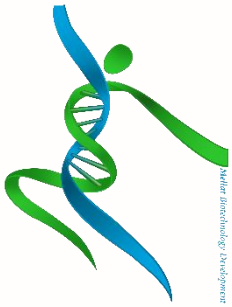
Dr. Mohammad Reza Sadeghi
Congress Chairman

Dr. Soheila Ansaripour
Scientific Secretariat

Safoora Soleimani Fakhr
Executive Secretariat

Reyhaneh Karimi
Executive Secretariat Deputy

Intellectual Supports



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(In Order to English Alphabet)

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Scientific Committee Biography

Dr. Irina Ershova

She is the researcher of Reproduction Department of State Budgetary Institution of Health Care Moscow Region «Moscow Regional Scientific Research Institute of Obstetrics and Gynecology».
She defended her thesis on "Optimization of in vitro fertilization and in vitro fertilization programs using donor oocytes in patients with thin endometrium".
Her main focus is treatment of infertility in patients with external genital endometriosis, reduced ovarian reserve, and uterine myoma.
She is the member of the Russian Association of Human Reproduction.
In recent years, she has been actively developing algorithms for the treatment of infertility in patients with severe forms of extragenital endometriosis with Krasnopolskaja Ksenija Vladislavovna, Doctor of Medical Sciences, professor, and corresponding member of the Russian Academy of Sciences.

Giles Palmer

Giles Palmer is a senior clinical embryologist, skilled in laboratory, business and quality management. After graduating in Genetics at Leeds University, UK, he attained a position as research officer at London's Hammersmith Hospital's acclaimed IVF unit working with Professors Lord Winston and Alan Handyside. After a consultancy position for Iceland's first IVF Unit (University Hospital, Reykjavik), he moved to Greece in 1992.
Since moving to Greece, he has worked in the largest IVF units in Athens.
He was director of the highly successful Assisted Reproduction Unit at Mitera hospital in Athens 2002-2016. His collaboration with St. Sophia's Children's Hospital (Athens University) resulted in the first birth in Greece following embryo-biopsy and pre-implantation genetic diagnosis, and has led to publications in Leading Scientific journals concerning many topics including pre-implantation genetic diagnosis for cystic fibrosis and beta-thalassaemia.
He is a member of ESHRE (European Society of Human Reproduction and Embryology), ARCS (The Association of Reproductive and Clinical Scientists), PEKE (Greek Society of Clinical Embryologists) , SLTB (Society of Low Temperature Biology) and has been accredited with Senior Embryologist Status by ESHRE.
More recently, he has become a consultant and product developer in a wide range of areas within the industry including cleanroom technology; quality management, risk assessment for clinics and cryo-storage facilities and artificial intelligence in ART

Dr. Hooman Sadri Ardekani

Hooman Sadri, MD, PhD, assistant professor, specializes in male reproductive medicine and is a fellowship-trained male infertility clinician. Currently, he serves as an MD director for the American Society of Andrology board of directors. He is also an active member of the American Society for Reproductive Medicine, the American Urological Association, and the Association for X and Y Chromosome Variations. His clinic is the national referral for Klinefelter syndrome, other genetic causes of hypogonadism, and spinal cord injury infertility. His expertise includes electroejaculation, vas reversal, and microsurgical testicular sperm extractions. As a former research scholar of the AUA and principal investigator in regenerative medicine and stem cell therapy, Dr. Sadri is directing the male fertility research program at the Wake Forest School of Medicine. Since 2014, he has established and directed the spermatogonia stem cell bank for fertility preservation of high-risk boys and men, which has rapidly become one of the largest worldwide bio-banking systems in this field.

Dr. Danilo Cimadomo

Danilo Cimadomo, MSc, PhD is the science and research manager of GeneraLife IVF. He is a molecular embryologist, and his research is mainly focused on embryo selection. He has authored over 100 papers. He is a member of the Executive Committee of SIERR with the role of coordinator of the scientific committee; he is basic science officer of the ESHRE SIG Implantation and Early Pregnancy, and associate editor of Human Reproduction Update. He was a member of the ESHRE working group that updated the good practice recommendations for embryo biopsy, and currently is a member of the group that is drafting the good practice recommendations for RIF definition and clinical management. He coordinates the master in "Biology and Biotechnology of Reproduction: from Research to Clinics" at the University of Pavia together with Professor Maurizio Zuccotti.

Prof. Ashok Agarwal

Ashok Agarwal is the director of the Andrology Center, and also the director of research at the American Center for Reproductive Medicine at Cleveland Clinic, Cleveland, USA. He is professor at the Cleveland Clinic Lerner College of Medicine of Case Western Reserve University, USA. Ashok is a senior staff in the Cleveland Clinic's Glickman Urological and Kidney Institute. He has published extensive translational research in human infertility and assisted reproduction. Ashok was the director of Male Infertility Research and an assistant professor of Urology at the Brigham and Women's Hospital and Harvard Medical School, Boston from 1988 - 92. Ashok worked as the director of the Andrology Laboratory and Sperm Bank at the Newton-Wellesley Hospital, Boston. He has served as the chairman of Board of the American College of Embryology from 2009 to 2012.

Prof. Juan Garcia Velasco

Juan García-Velasco, MD, PhD, is chief scientific director or IVI RMA Global and director of IVI RMA Madrid, where he attends his patients. He is also professor of obstetrics and gynaecology at Rey Juan Carlos University, Madrid, Spain, where he is director of their master's degree programme in human reproduction. Professor García-Velasco graduated from University Medical School, Madrid, in 1990 and received his obstetrics and gynaecology certification from La Paz Hospital, Madrid, in 1995. He completed his PhD in medicine at Autonoma University, Madrid, in 1995, and from 1997 to 1998 studied at Yale University, New Haven, CT, under a Reproductive Endocrinology and Infertility Fellowship. Professor García-Velasco's main research interests have been in IVF and endometriosis. He is the principal investigator of projects funded by the Ministry of Education and Ministry of Health in Spain, and has received awards from the Spanish Fertility Society, Spanish Society of Obstetrics and Gynaecology, and the European Society of Human Reproduction and Embryology. He has published over 200 peer-reviewed articles and 30 book chapters and 6 books on human reproduction, endometriosis and hypo- and hyper-ovarian stimulation response. He is the co-editor of Reproductive Biomedicine Online.

Dr. Amir Hossein Ansaripoor

Amir is a senior lecturer in the School of Management at Curtin University, where he joined in 2015. He holds a Ph.D. degree in business administration specializing in operations management and decision sciences from ESSEC Business School (France and Singapore) and a Master's degree in Industrial Engineering from Sharif University (Iran). His Ph.D. project was fully funded both by ESSEC Business School, Singapore, and British Telecom (BT) company, UK. Amir's research interests are mainly based on using operations research, data science, and business analytics techniques to solve complex problems in different applications, including but not limited to industry 4.0 (AI and Blockchain), risk management, supply chain management, logistics, fleet management, agriculture, healthcare, finance, energy, and environment. His research has been published in top tier journals such as the European Journal of Operational Research, Transportation Research Part C, International Journal of Production Economics, and International Journal of Production Research. Amir also has coordinated and delivered several units, such as logistics and supply chain management, quantitative modelling, and operations management at undergraduate and postgraduate levels

Dr. Alexey Koval

He is the specialist in minimally invasive surgery (laparoscopy, hysteroscopy, robot-assisted surgery) in gynecology and works in Moscow Regional Scientific Research Institute of Obstetrics and Gynecology in the Operative Gynecology department under the supervision of prof. Alexander Popov.
In 2016, he was approved as the Chairman of the Council of Young Scientists of GBUZ MO MONIIAG.
In 2018, he completed a two-week internship at the University Hospital of Clermont-Ferrand (France).
In 2022, he completed an internship at the University Hospital of Louisville (USA).
In 2022, he completed an internship with Mario Malzoni at the Casa Di Cura Malzoni clinic (Avellino, Italy).

Prof. Sidney Gilna

He is the head of the Division of Urology at Centro Universitario FMABC-Santo, Andre-Sp-Brazil
Past president of international Society of Sexual Medicine (2000-2)
Past president of Brazilian Society of Urology (2006-7)

Prof. Alexander Popov

Dr., Prof. Aleksander Popov is the head of the department of operative gynecology with oncogynecology with day hospital in the Moscow Regional Scientific Research Institute of Obstetrics and Gynecology. The main directions of his professional activities are listed below: surgical treatment of benign and borderline tumors of the uterus and adnexes, reproductive surgery, surgical and conservative treatment of endometriosis, surgical treatment of genital prolapse and urinary incontinence, and robot-assisted surgery in gynecology. For more than 25 years of practice, he has published about 360 scientific works and 3 monographs. In cooperation with other colleagues, he is the author of 5 invention patents registered in Russia. He is one of the authors and leading experts for Federal Endometriosis and Myomas Guidelines. More than 30 PhD students defended their doctoral thesis in his department under his supervision. He is among the editors of several medical journals published in Russia. Dr. Popov was trained in leading clinics such as Clinic Mayo (prof. S. Podrats), Clinic NY University (prof. H. Reich), Germany Clinic of the University of Kiel (prof. K. Semm), and France University Clinic Clermont, Ferrand (prof. M. Bruihat). He is the member of professional associations like the Russian Association of Human Reproduction (RAHR), Russian Association of Endoscopic Gynecologists (RAEG), Russian Association of Endometriosis (RAE), the European Association of Endoscopic Gynecology (ESGE), the European Association of Endometriosis (EEL), the World Association of Endometriosis (WES), Society of European Robotic Gynecological Surgery (SERGS), Society of Endometriosis and Uterine Disorders (SEUD), and American Association of Gynecologic Laparoscopists (AAGL).

Dr. Majid Tarahomi
Embryologist
Associate professor of Avicenna Research Institute (ARI)

Dr. Sheyda Jouhari
Obstetrician and gynecologist at Denmark
Fellowship in infertility treatment

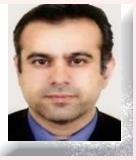
Dr. Mohammad Reza Sadeghi
Embryologist
Chairman of Avicenna Research Institute

Dr. Saeed Reza Ghaffari
Genetic specialist

Dr. Shahnaz Ahmadi
Obstetrician and gynecologist
Fellowship in infertility
Faculty member at Iran University of Medical Sciences, Tehran, Iran

Dr. Abbas Aflatoonian
Professor of obstetrics and gynecology at Shahid Sadoughi University of Medical Sciences, Yazd, Iran
Founder of Yazd Reproductive Sciences Institute
Founder of Yazd Madar Hospital
Editor in chief of International Journal of Reproductive Biomedicine

Dr. Marefat Ghaffari Novin
Embryologist
Professor at Shahid Beheshti University of Medical Sciences, Tehran, Iran



Dr. Saeed Arasteh
Urologist at Avicenna Fertility Center, Tehran, Iran
Fellowship in kidney transplantation
Member of Iranian Urological Association (IUA)
Member of European Association of Urology (EAU)
Member of Iranian Society for Reproductive Medicine (ISRM)

Dr. Behrang Abadpour
Urologist
Fellowship in kidney transplantation
Urologist at Avicenna Fertility Center, Tehran, Iran

Dr. Mahshid Bazrafkan
Embryologist
Associate professor of Avicenna Research Institute (ARI), Tehran, Iran
ESHRE certified clinical embryologist

Dr. Simin Zafardoust
Gynecologist
Fellowship in infertility
Assistant professor and faculty member at Avicenna Fertility Center, Tehran, Iran
Founder of cell therapy clinic for treatment of patients with poor ovarian reserve

Dr. Mina Ataei
Obstetrician and gynecologist
Fellowship in infertility and IVF
Faculty member of Alborz University of Medical Sciences, Karaj, Iran
Member of the specialized team at Avicenna Fertility Center

Dr. Soheila Ansaripour
Researcher and assistant professor at Avicenna Fertility Center
Immunologist, fellowship in reproductive immunology
Head of the Department of Immunology at Tehran University of Medical Sciences
Founder, researcher, and faculty member of Reproductive Immunology Research Group at Avicenna Research Institute (ARI), Tehran, Iran
Member of European Society for Reproductive Immunology (ESRI)

Dr. Alireza Milanifar
MD, LL.B, MPH
PhD in medical ethics and law
Faculty member of Biolaw and Ethics Research Group at Avicenna Research Institute (ARI), Tehran, Iran

Dr. Farnaz Montazeri
Obstetrician and gynecologist
Fellowship in infertility and IVF

Dr. Soheila Arefi
Fellowship in infertility
Associate professor of
Avicenna Research Institute (ARI), Tehran, Iran

Dr. Mohammad Ebrahim Parsanezhad
MD, professor of obstetrics and gynecology at Shiraz University of Medical Sciences, Shiraz, Iran
Fellowship in infertility

Dr. Ashraf Moeini
Faculty member at Tehran University of Medical Sciences
Fellowship in infertility
Member of specialized team at Royan Institute, Tehran, Iran

Dr. Sedigheh Hantooshzadeh
Obstetrician and gynecologist
Fellowship in perinatology
Professor of obstetrics and gynecology at Tehran University of Medical Sciences, Tehran, Iran

Dr. Shideh Ariana
MD, obstetrician and gynecologist
Fellowship in perinatology
Assistant professor of Shahid Beheshti University of Medical Sciences, Tehran, Iran

Dr. Zahra Heidar
Obstetrician and gynecologist at Mahdieh Hospital
Fellowship in infertility
Associate Professor of Shahid Beheshti University of Medical Sciences, Tehran, Iran

Dr. Amir Hassan Zarnani
Immunologist
Fellowship in reproductive immunology
Head of Department of Immunology, School of Public Health at Tehran University of Medical Sciences
Faculty member of Reproductive Immunology Research Center at Avicenna Research Institute (ARI)
Member of European Society for Reproductive Immunology (ESRI)
Founder of Reproductive Immunology Research Center of Avicenna Research Institute (ARI), Tehran, Iran

Dr. Ashraf Alyasin
MD, obstetrician and gynecologist
Fellowship in infertility
Professor of obstetrics and gynecology at Tehran University of Medical Sciences, Tehran, Iran

Dr. Sedigheh Hosseini
Obstetrician and gynecologist
Fellowship in infertility
Faculty member of Shahid Beheshti University of Medical Sciences, Tehran, Iran

Dr. Mitra Zandi
BScN, MScN, Ph.D, Post Doc. in nursing
Associate professor of medical surgical nursing at
Shahid Beheshti University of Medical Sciences, Tehran, Iran

Dr. Shahrzad Zadeh Modarres
Obstetrician and gynecologist
Fellowship in infertility
Professor of Shahid Beheshti University of Medical Sciences, Tehran, Iran

Dr. Mahsa Naemi
Obstetrician and gynecologist
Perinatologist
Assistant professor at Tehran University of Medical Sciences, Tehran, Iran

Dr. Fatemeh Sarvi
Obstetrician and gynecologist
Fellowship in infertility
Assistant professor at Tehran University of Medical Sciences, Tehran, Iran

Dr. Nastaran Teimouri
Obstetrician and gynecologist
Fellowship in perinatology from Tehran University of Medical Sciences, Tehran, Iran
Associate Professor at Iran University of Medical Sciences
Skilled in performing various obstetric ultrasound scans to detect different fetal,
Structural, and genetic abnormalities

Dr. Haleh Soltan Ghoraee
Associate professor of Personalized Medicine in Reproductive Health Research Group at Avicenna Research Institute
Clinical pathologist
Fellowship in perinatal and pediatric pathology
Technical director of pathology laboratory of Avicenna Fertility Center, Tehran, Iran

Dr. Atefeh Gorgin
Obstetrician and gynecologist
Fellowship in advanced laparoscopic surgery and endometriosis
Member of the specialized team at Avicenna Fertility Center, Tehran, Iran

Dr. Roxana Kargar
Obstetrics and Gynecology specialty board from Shahid Beheshti University of Medical Sciences in 2012
Fellowship in advanced laparoscopic surgery and endometriosis from Avicenna Research Institute in 2016
Member of specialized team of Avicenna Fertility Center since 2017

Dr. Alireza Chamani
Anesthesiologist
Operating room manager at Avicenna Fertility Center
Anesthesiologist of specialized team of endometriosis at Avicenna Fertility Center since 2010
Head of Anesthesiology Department and Intensive Care Unit at Avicenna Fertility Center

Dr. Roya Padmehr
Obstetrician and gynecologist
Fellowship in advanced laparoscopic surgery in gynecology and endometriosis
Instructor of laparoscopy and hysteroscopy courses
Member of Iranian Society of Minimally Invasive Surgery
Member of Iranian Association of Obstetricians and Gynecologists
Member of Medical Council of the Islamic Republic of Iran

Dr. Khadijeh Shadjoo
Obstetrician and gynecologist
Fellowship in advanced laparoscopy and endometriosis
Member of Iranian Society of Minimally Invasive Surgery
Director of Endometriosis Clinic at Avicenna Fertility Center
Gynecologist and laparoscopist of Erfan Hospital, Tehran, Iran

Dr. Afsaneh Mohammadzadeh
Gynecologist
Fellowship in IVF and assisted reproductive technology
Associate professor at Avicenna Research Institute (ARI), Tehran, Iran
Head of Department of Infertility Fellowship Training Programs at Avicenna Fertility Center

Dr. Shahrzad Hashemi
Obstetrician and gynecologist
Fellowship in perinatology

Dr. Sedigheh Borna

MD, obstetrician and gynecologist
Fellowship in perinatology
Professor of obstetrics and gynecology at Tehran University of Medical Sciences, Tehran, Iran

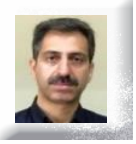
Dr. Parichehr Pooransari
MD, obstetrician and gynecologist
Fellowship in perinatology
Associate professor of Shahid Beheshti University of Medical Sciences, Tehran, Iran

Dr. Soudabeh Kazemi
MD, obstetrician and gynecologist
Fellowship in perinatology
Associate professor of Gilan University of Medical Sciences, Guilan, Iran

Dr. Zahra Panahi
Obstetrician and gynecologist
Fellowship in perinatology
Assistant professor at Tehran University of Medical Sciences, Tehran, Iran

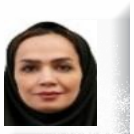
Haleh Maleki
BSc in Midwifery
MSc in executive management
Director of Replacement Therapies Clinic and
Director of Sexual Health Clinic at Avicenna Fertility Center, Tehran, Iran

Zatollah Asemi,
PhD, associate professor of nutritional sciences at
Research Center for Biochemistry and Nutrition in Metabolic Diseases,
Kashan University of Medical Sciences, Kashan, Iran



Dr. Fatemeh Foroozanfard
Obstetrician and gynecologist
Fellowship in infertility
Associate professor at Kashan University of Medical Sciences, Kashan, Iran

Bahareh Abbasi
Member of specialized team at Avicenna Fertility Center
Former member of the British Society for Gynaecological Endoscopy (BSGE) in 2014-2017
Nursing supervisor of inpatient department at Avicenna Fertility Center in 2011-2013



Dr. Ali Sadeghitabar
PhD MLD, faculty member of immunochemistry research group at Avicenna Research Institute (ARI), Tehran, Iran
Manager of Avicenna Fertility Center
Technical director of medical diagnostic laboratory of Avicenna Fertility Center

Dr. Mina Jafarabadi

MD., gynecologist

Fellowship in infertility

Associate professor at Tehran University of Medical Sciences, Tehran, Iran

Dr. Mansoureh Movahedin
PhD in clinical embryology
Professor at Department of Anatomical Sciences of Tarbiat Modares University, Tehran, Iran

Dr. Saghar Salehpour
Obstetrician and gynecologist
Fellowship in IVF and infertility treatment
Faculty member of Shahid Beheshti University of Medical Sciences, Tehran, Iran

Dr. Mahnaz Heidari
PhD in reproductive biology
Embryologist
Faculty member of Avicenna Research Institute, ACECR, Tehran, Iran

Dr. Naser Amirjannati
Urologist
Faculty member of Avicenna Research Institute, ACECR, Tehran, Iran

Dr. Kaveh Soltanzadeh
Urologist
Male infertility specialist
Member of Iranian Urological Association (IUA)
Member of Avicenna Fertility Center, ACECR, Tehran, Iran

Dr. Fatemeh Hassani
Clinical embryologist
Faculty member at Royan Institute, Tehran, Iran

Dr. Elham Hosseini
PhD in reproductive biology
Clinical embryologist
Faculty member of Zanjan University of Medical Sciences, Zanjan, Iran

Dr. Mina Vardiani
PhD in reproductive biology
Clinical embryologist
Member of Avicenna Fertility Center, ACECR, Tehran, Iran

Dr. Mohammad Kazemian
Forensic Medicine Specialist
Chairman of Association of Forensic Physicians of Iran
Treatment Deputy of Ebnesina Hospital, Tehran, Iran

Dr. Fatemeh Hajibabaei
PhD in nursing management
Assistant professor of School of Nursing and Midwifery,
Tehran University of Medical Sciences, Tehran, Iran

Ms. Farzaneh Sadri

MSc in nursing

Nursing director at Sarem Hospital, Tehran, Iran

Fatemeh Shayesteh Partou
MSc in counseling in midwifery
Member of Avicenna Fertility Center, ACECR, Tehran, Iran

Zahra Ezabadi
MSc in medical education
Director of the Department of Nursing and Midwifery,
Royan Institute, Tehran, Iran

Fataneh Nazari
MSc in midwifery, mother and child health
Assistant at Patient Training Unit
Member of Avicenna Fertility Center, ACECR, Tehran, Iran

Maryam Takallou
Midwife
Member of Avicenna Fertility Center, ACECR, Tehran, Iran

Safoora Soleimani Fakhr
Education deputy and manager of Public Relations Office
Avicenna Research Institute, ACECR, Tehran, Iran

Dr. Azam Sadat Mahdavi
Obstetrician and gynecologist
Fellowship in infertility and laparoscopy from France
Member of the specialized team at Avicenna Fertility Center, Tehran, Iran

Dr. Ameneh Lahouti
Obstetrician and gynecologist
Fellowship of infetility and IVF

Dr. Shahrzad Ansari
Obstetrician and gynecologist at IVF Center of Mehr Hospital, Tehran, Iran
Obstetrics and gynecology specialty board
Specialist in advanced hysteroscopy, laparoscopy, and IVF
Senior gynecologist and infertility specialist at Day General Hospital

Dr. Atousa Karimi
Obstetrician and gynecologist
Fellowship in infertility
Associate professor of Avicenna Research Institute (ARI), Tehran, Iran

Abstracts

The Role of Nutrition and Supplements in PCOS

Zatollah Asemi

Research Center for Biochemistry and Nutrition in Metabolic Diseases, Kashan University of Medical Sciences, Kashan, Iran

Abstract

Polycystic ovary syndrome (PCOS) is one of the most common endocrine disorders in reproductive aged women. Prevalence of PCOS varies depending on its definition and it affects 6-15% of individuals. Metabolic complications such as insulin resistance and systemic inflammation contribute to the abnormalities seen in PCOS. It was reported that more than two thirds of patients with PCOS are insulin resistant. Recent studies have also demonstrated that increased biomarkers of oxidative stress are involved in PCOS. PCOS is associated with impaired glucose tolerance, infertility, dyslipidemia, type 2 diabetes mellitus, and cardiovascular diseases. In addition, PCOS accounts for at least 75% of anovulatory infertility cases.

Increased understandings of the role of insulin resistance and other metabolic disorders including inflammation and oxidative damage in the pathogenesis of PCOS have led to the development of new strategies, such as dietary modifications and appropriate nutritional supplementation in the treatment of PCOS. Recently, it has been postulated that following a low-carbohydrate, high-protein diet as well as Mediterranean diet might help healthy subjects and patients with PCOS to prevent complications of insulin resistance and hyperandrogenism. The Dietary Approaches to Stop Hypertension (DASH) as an eating plan is a low-glycemic-index low-energy-dense diet that its beneficial effects have been reported in cases with insulin resistance, increased inflammation, obesity, PCOS, type 2 diabetes mellitus, gestational diabetes, and metabolic syndrome. As PCOS is associated with hormonal imbalance, high contents of dietary fiber, phytoestrogens and isoflavones as well as low glycemic index in the DASH and Mediterranean diets might help PCOS patients in decreasing insulin resistance and inflammatory factors.

New insulin sensitizers containing inositol have been reported in the treatment of women with PCOS. Few studies have reported the beneficial effects of myo-inositol on insulin sensitivity and androgen excess, inflammatory markers, and oxidative damage. Furthermore, myo-inositol intake improved reproductive axis functioning in patients with PCOS, reducing hyperinsulinemia. Genes involved in vitamin D regulation are related to glucose and lipid metabolism and blood pressure control. Vitamin D may also affect inflammation and oxidative stress through its impact on preventing damaged DNA propagation in cellular levels. Vitamin D supplementation might improve hyperandrogenism, ovarian follicles maturation, ovulation, and weight control in subjects with PCOS. A combination of different nutrients and improving overall nutritional status might have beneficial effects for women suffering from PCOS; for instance, a combination of magnesium, zinc, calcium, and vitamin D influenced markers of inflammation, oxidative stress, and impaired hormones in women with PCOS. Similarly, supplementation with omega-3 fatty acid, an important fatty acid with immunomodulatory and anti-inflammatory functions which improves insulin sensitivity and reduces cholesterol absorption, has been suggested to improve metabolic abnormalities, mental health, and hormonal profile and related symptoms in women with PCOS.

Keywords: Hyperandrogenism, Insulin resistance, Polycystic ovary syndrome, Vitamin D

Does PCOS Affect Pregnancy?

Parichehr Pooransari

Shahid Beheshti University of Medical Sciences, Tehran, Iran

Abstract

Polycystic ovary syndrome (PCOS) is a heterogeneous disorder characterized by clinical or biochemical hyperandrogenism with ovulatory dysfunction.

Women with polycystic ovary syndrome (PCOS) are at higher risk for certain problems or complications during pregnancy. In addition, infants born to mothers with PCOS are at higher risk of requiring neonatal intensive care or higher risk of death before, during, or right after birth. Insulin resistance, both intrinsically and due to superimposed obesity, forms the most important pathogenetic mechanism for PCOS complications. It therefore seems logical to treat PCOS complications with insulin sensitizers.

Complications of pregnancy commonly associated with PCOS could be a reason for these risks. Also, conditions common to PCOS like metabolic syndrome and androgen excess may increase the risk factors affecting infants.

In general, pregnancy complications related to PCOS include miscarriage or early pregnancy loss, gestational diabetes, preeclampsia, gestational hypertension, preterm labor, and C-section delivery.

Keywords: Androgen excess, Insulin sensitizer, Metabolic syndrome, Polycystic ovary syndrome (PCOS)

The Association Between Female Age, Oocyte Numbers, and Cumulative Live Birth Rates

Abbas Aflatoonian

Research and Clinical Center for Infertility, Yazd Reproductive Sciences Institute, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

Abstract

The most important aim of in vitro fertilization is to achieve a successful pregnancy and a term live birth. For that matter, the association between the number of retrieved oocytes with cumulative live birth rate (CLBR) suggests that more oocyte yields lead to an increased chance of cumulative live birth per aspiration. Even though results from the previous studies are strong enough to indicate a positive relationship between number of retrieved oocytes and CLBR, the potential effect of female age has not yet been appropriately evaluated. It is assumed that the association between the number of retrieved oocytes and live birth rate is not the same for all female ages.

It is well established that female age negatively affects the quality of oocytes retrieved. Older women have a significantly higher risk of developing aneuploid embryos and less ability to create high number of oocytes on aspiration. A recent large retrospective cohort study revealed strong positive association between the number of retrieved oocytes and CLBR ranging from 10% to 66% for 1–3 oocytes and ≥25 oocytes, retrospectively. When the age as a modifying factor is applied, the rate for increase of CLBR per additional retrieved oocyte was lower in older women. Moreover, the highest probability of achieving a cumulative live birth per aspiration in women between 18–34 years of age was related to an oocyte yield of about 25 oocytes. Among women between 36–44 years, cumulative live birth per aspiration tends to increase with more than 30 retrieved oocytes. Furthermore, in women older than 45 years, however, the probability was very low; the best rate of CLBR per aspiration was achieved after an oocyte yield of around 9.

According to another retrospective cohort study on 256,643 fresh cycles, a maximum LBR (31%-34%) was reached in women aged <30 with 6-11 retrieved oocytes.

In conclusion, the optimal number of oocytes where the maximum LBR was observed in a fresh cycle was highly dependent on female age. The results from studies indicate that this number is around 25 oocytes in women between 18–35 years, more than 30 in women between 36–44 years, and around 9 in women 45 years and older.

Keywords: Cumulative live birth rate, Female age, In vitro fertilization, Oocyte yield

Egg Donor Screenings for the Treatment of Infertility

Farzaneh Sadri

Sarem Hospital, Tehran, Iran

Abstract

Today, infertility treatment in couples is influenced and improved by advanced methods and IVF techniques. In many infertile cases, providing proper eggs is impossible and oocyte/egg donation is a feasible alternative though the procedure is not considered a lawful act in many countries; however, based on a law passed by the Islamic Parliament of Iran, the act of oocyte/egg donation has been deemed legal in Iranian context.

Considering the fact that the recipient family is affected by the child born from the egg donation, it is important to examine the physical and mental health of egg donors. Moreover, legal dimensions of the donation procedure must be the main priority of infertility treatment centers and all necessary evaluations and assessments should be carried out by such centers:

The following practices need to be implemented in above mentioned centers:

1. Accurate examination of the physical condition of donors in terms of infectious diseases such as HIV
2. Investigating the status of the donor's inheritance patterns and genetic variants
3. Investigating the cultural, religious, social, and psychological aspects and characteristics of the donors

In addition, maintaining the confidentiality of the donor's identity and personal information and focusing on the issues related to the rights of the child resulted from the donation should be discussed and scrutinized. Also, determining and limiting the number of donations in order to prevent the occurrence of generation genetic mixing and the increase of family marriages, it is necessary to design policies based on professional and ethical principles in infertility treatment centers. Moreover, establishment of donor egg banks from donation volunteers also requires the preparation of instructions and policies under the supervision of official authorities of the country.

Keywords: Egg donors, Infertility treatment, Islamic Parliament of Iran, Legal dimensions

Ovulation Induction in Cases with Polycystic Ovary Syndrome

Sedigheh Hosseini

Shahid Beheshti University of Medical Sciences, Tehran, Iran

Abstract

For oligo-ovulatory women with PCOS undergoing ovulation induction, letrozole as first-line therapy over clomiphene citrate can be used regardless of the patient's BMI. Before starting letrozole, the clinician must discuss with the patients that the drug application is not approved by the US Food and Drug Administration (FDA) for this purpose and that there is an available alternative (clomiphene citrate).

Clomiphene citrate had been the first-line drug for this population for many years, with metformin used as an alternative. However, both clomiphene and metformin appear to be less effective for high rates of live birth than letrozole.

Another method to induce ovulation is administration of exogenous gonadotropins. Women with PCOS and anovulatory infertility treated with gonadotropins are at high risk for ovarian hyperstimulation syndrome (OHSS). Exogenous gonadotropin regimens are complex and expensive and are recommended by experienced clinicians; most clinicians suggest an assessment of fallopian tube patency before initiating these relatively aggressive therapies. If weight loss, ovulation induction with medications, and/or laparoscopic ovarian laser electrocautery are unsuccessful, the next step would be the application of IVF.

Keywords: IVF, Letrozole, Ovulation induction, Polycystic ovary syndrome

Gamete and Embryo Donation Management

Zahra Ezabadi

Department of Endocrinology and Female Infertility, Reproductive Biomedicine Research Center, Royan Institute for Reproductive Biomedicine, ACECR, Tehran, Iran
Department of Epidemiology and Reproductive Health, Reproductive Biomedicine Center, Royan Institute for Reproductive Biomedicine, ACECR, Tehran, Iran

Abstract
The use of sperm, oocyte, and embryo donation services has increased over the past several decades. The availability of donor gametes provides an opportunity for individuals and couples to build a family who otherwise may not be able to conceive.
Donors are defined as individuals who are not sexually intimate partners of the recipients; donor eligibility determination is required for donor sperm, donor oocytes, donor embryos, and sperm and oocyte sources when planning to use a gestational carrier.
The aim of this study was to review the screening of donors and recipients and comment on prenatal optimization, evaluate psychoeducational counseling of donors and recipients, and assess genetic risks. Therefore, several topics including indications for donations, screening and selection of donors, management of sperm/oocyte donors and recipients and screening their partners, psychoeducational counseling with donors and recipients, genetic screening, donor eligibility questionnaire, legal considerations, physical exam, and laboratory testing were discussed in this presentation.

Keywords: Donor insemination, Donor screening, Oocyte, Sperm

How Embryology Laboratory Environmental Criteria Can Affect Oocyte Quality?

Mansoureh Movahedin

Anatomical Sciences Department, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Abstract

Despite great advances in the field of infertility treatment, the success rate of ART procedures remains unsatisfactory in many cases and the methods require further improvements. Basic conditions for culturing human cells are control of temperature, PH, osmolality, and sterility. Oxidative stress (OS) has been established as an important factor that can negatively affect ART outcomes. Several external factors may induce high reactive oxygen species (ROS) production in the ART setup, including atmospheric oxygen, CO2 incubators, consumables, visible light, temperature, humidity, volatile organic compounds, and culture media additives. Pathological ROS levels can also be generated during the cryopreservation-thawing process of gametes or embryos.

Regarding culture media, human serum albumin (HSA) plays a multitude of roles during embryo culture and is a carrier for molecules including lipids. It remains unclear if lipid composition of HSA varies among commercial products and its effects on embryo quality, implantation, and fetal outcomes are relatively unknown.

Exposure of oocytes and embryos to suboptimal conditions in terms of temperature, pH, and oxygen is unavoidable, as many crucial steps of the IVF procedure, such as oocyte collection and denudation, ICSI, and embryo transfer, are performed outside the incubator.

In order to achieve the desired result after various gametes and embryos manipulations, special attention should be paid to the environmental factors of the embryology laboratory. In addition to appropriate design of the laboratory space, the control of environmental factors that are constantly changing and can have undesirable effects on the quality of gametes and embryos are among the affective factors in success of pregnancy.

Keywords: ART outcomes, Human serum albumin, Laboratory environmental factors, Oxidative stress, Reactive oxygen species

Indications of Histological Evaluation of Conception Products

Haleh Soltanghoraee, Arash Mohazzab, Azadeh Soltani, Soheila Ansaripour, Maryam Tavakoli, Maryam Rafati, Amir Hassan Zarnani, Saeed Reza Ghaffari

Avicenna Fertility Center, Avicenna Research Institute, ACECR, Tehran, Iran

Abstract

Background: There has always been controversy surrounding the histopathological evaluation of pregnancy loss in the first trimester. Even though there are some common recommendations, no specific guidelines have been prepared for such indications.

Materials and Methods: Six hundred eighty-six samples were collected from an infertility referral clinic, evaluated microscopically, and categorized. Genetic methods were used to evaluate 295 cases (Multiplex Ligation-dependent Probe Amplification).

Results: It was revealed that 361 of 569 samples with chorionic villi had three or more first trimester pregnancy losses in their histories. A high rate of recurrence was observed in 18.3% of this group with chronic intervillositis of unknown etiology (CIUE) and 8.3% with intervillous fibrin deposition. In the CIUE group, the number of live children was significantly higher and 29% of genetically evaluated cases had a chromosomal abnormality.

Conclusion: A histological examination of recurrent pregnancy loss could provide insight into the cause of abortion in a relatively reasonable proportion of cases, particularly in mothers with multiple abortions in the past, as well as in mothers who have a history of live births in referral centers.

Keywords: Chronic intervillositis of unknown etiology, Histological evaluation, Live birth, Recurrent pregnancy loss

Investigating the Role of Midwives in Infertility Treatment Centers

Fatemeh Shayesteh Partou

Avicenna Fertility Center, ACECR, Tehran, Iran

Abstract

Midwives are valuable workforces in the healthcare systems of all countries in any field or stage of women's health. Their worth was constantly assigned to their performance-based labor. Infertility is a completely new field in which many innovative approaches have been developed over the years, and despite wonderful assistance of midwives in infertility treatment centers, their precise role is not recognized in this field. The importance of their assistance is undeniable and more studies should be conducted to clarify their role and participation in this important field and in medical and therapeutic services.

The role of midwives in childbirth has been well established over the centuries. Midwives were traditionally women who could help pregnant women during childbirth. Over the years, this profession has evolved and today academically educated and trained midwives are able to help women during pregnancy, before childbirth and of course during the postpartum period; in other words, all women from puberty to even after the reproductive period can benefit from the help and professional services of midwives.

Midwives have an important task in counseling and teaching health not only for women but also for the family and society. Their services have expanded to include prenatal education, parenthood preparation, education on sexual and reproductive health issues, menopause care, and even child care. A midwife can provide service in any places including home, communities, hospitals, clinics or health units.

Infertility has become a social concern in today's world as it can affect various aspects of the couple's life culminating in several disasters like confusion, anxiety, despair, sense of emptiness, feelings of guilt and deprivation; moreover, it causes an increase in marital conflicts and a decrease in satisfaction from marital life. To top it all off, by creating problems in the emotional relationships, the couples will break up; since about 50 million couples around the world suffer from the problem of infertility, the importance of the role of midwives in the infertility treatment centers becomes a significant topic for investigation. According to studies, one couple out of every 4 couples in developing countries and one couple out of every 10 couples worldwide suffer from infertility. In Iranian couples, the prevalence of infertility is much higher than the global prevalence. Infertility prevalence in Iran is 20.2% with 19.9% in cities and 22% in villages. Infertility prevalence in Africa is 30%, in Europe it is 9-15%, and 55% of cases seek infertility treatments. This has led to the formation of many infertility treatment centers around the world. In all these centers, in addition to infertility specialists, midwives also provide services. Midwives are an important workforce in infertility centers in all countries, including Iran, who have a key role in facing infertile couples and communicating with them in various aspects of their problems. These health professionals play substantive roles in infertility management and psychological support for infertile couples. Also, their expertise in managing the stress of infertile couples is noticeable. According to European Union Law, the presence of at least one midwife with at least 2 years of experience in this field is required for the efficient operation of an infertility treatment unit.

Studies show that infertile women mostly remember the midwives who supported them. In other words, they don't forget the person who understood and accompanied them in this journey.

Keywords: Childbirth, Infertility treatment, Midwifes, Postpartum period

The Importance of Time in Different Steps of Vitrification of Oocytes and Embryos

Fatemeh Hassani

Department of Embryology, Reproductive Biomedicine Research Center, Royan Institute for Reproductive Biomedicine, ACECR, Tehran, Iran

Abstract

One of the most pressing issues in reproductive biology is how to improve fertility preservation. One of the important and useful treatments for female infertility treatment is oocyte cryopreservation. For fertility preservation, egg donation, and for postponing pregnancy based on any social or medical reasons, oocyte freezing is effective. The most recent reports indicate that the success of oocyte vitrification and subsequent fertilization can be influenced by a number of factors. The choice of time during the freezing process is one of these factors. Fertilization of vitrified-thawed oocytes is heavily influenced by four time factors:

1) the timing of the oocyte retrieval following the administration of HCG, 2) the freezing time following the oocyte retrieval, 3) the freezing procedure, and 4) the duration of the culture prior to fertilization. Further research is needed to determine how long-term cryostorage affects biological competence of thawed oocyte and clinical outcomes like fertilization, pregnancy, and live birth rates. Since 1983, frozen embryo transfer (FET) has grown steadily worldwide, and it is now one of the standard clinical assisted reproductive techniques. FET is becoming more and more common because vitrification is used to freeze embryos.

It is well known to be safe and effective when used with excess embryos. There is a debate regarding whether FET should be performed in the cycle immediately following OPU (oocyte pick-up) or at least one cycle later. When embryo transfer (ET) is performed during the menstrual cycle that appears immediately after, some researchers have found that PRs (pregnancy rates) are higher in retrospective studies. On the other hand, some authors have reported better clinical outcomes in delayed FET or ET delayed by less than one menstrual cycle, but the difference was not significant, and others have reported no differences. When associated variables were taken into account, the disparities in some of the reports in favor of immediate FET vanished as well. The evidence regarding long-term vitrification's effect on embryo viability and subsequent success rate is still up for debate; one study found lower clinical pregnancy rates and LBRs (live birth rates) while another found no effect on implantation potential.

Keywords: Cryopreservation, Fertility preservation, Frozen embryo transfer (FET), Vitrification

Endometriomas and Infertility

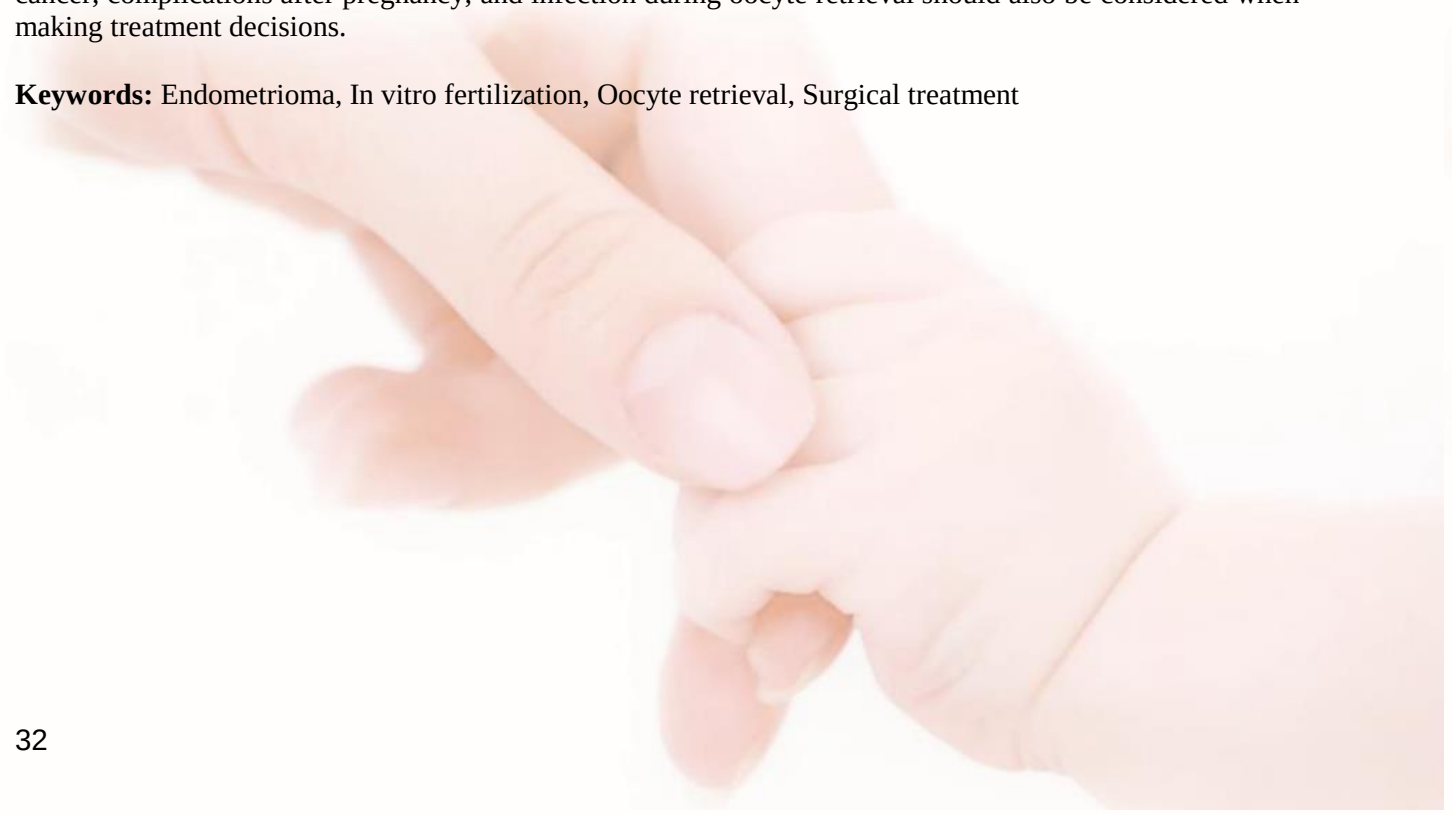
Atefeh Gorgin

Avicenna Fertility Center, ACECR, Tehran, Iran

Abstract

The prevalence of endometriosis is about 10% in reproductive-age women. Infertility affects 30% to 50% of women with endometriosis. Women with endometriosis are at risk of decreased ovarian reserve, because of the pathophysiology of the disease and iatrogenic injury resulting from surgical intervention. Patients with severe endometriosis, particularly bilateral endometriomas, are at high risk of premature ovarian insufficiency (POI) and lower AMH levels. Ovarian reserve is defined as the number and quality of the follicles left in the ovaries at any given time. Endometrioma can decrease functional ovarian tissue based on space-occupying effects, local reactions or both. Although laparoscopic cystectomy is the gold standard for the treatment of endometrioma, there are some risks associated with the procedure that may damage ovarian function, even when performed by experienced surgeons. During the procedure, the vascular system within the ovarian cortex or surrounding the ovary can be injured, which can result in lower serum AMH levels by an inadequate blood supply in patients' body. Surgical excision may increase the possibility to achieve pregnancy by restoring the anatomy of the affected ovaries in patients with endometrioma. Considering the insufficient evidence favoring surgical excision before ART, cystectomy should only be suggested in specific situations, such as suspicious features, progressive symptoms, and large cysts. In cases of bilateral ovarian endometriomas (in which the smaller one measures more than 3 *cm*) and patients experiencing recurrence of ovarian endometrioma, fertility preservation is the best alternative. Optimizing and preserving fertility in women with endometriosis begins with preventing iatrogenic injury. Repeat surgeries for endometriosis do not improve fertility outcomes, and patients who do not become pregnant after the first procedure should be counseled to undergo IVF. Among infertility patients with endometriosis, with and without a history of ovarian surgery, ovarian reserve markers were worse (lower AMH and higher FSH levels) and a higher proportion had decreased ovarian reserve as measured by AMH levels. A negative correlation between ovarian endometrioma (OMA) size and AFC levels in patients with unoperated OMAs was detected. Women with untreated endometriomas showed decreased pre-surgical AMH levels, especially those with bilateral lesion, severe endometriosis at the surgery, and laterality of the disease compared to control women without endometriosis or with other benign ovarian cysts. In cases of mild- to moderate-stage endometriosis, intrauterine insemination with ovarian stimulation after surgical treatment may increase the likelihood of pregnancy. In cases of severe endometriosis, surgical treatment and assisted reproduction methods such as *in vitro* fertilization are the best practices. The risk of cancer, complications after pregnancy, and infection during oocyte retrieval should also be considered when making treatment decisions.

Keywords: Endometrioma, In vitro fertilization, Oocyte retrieval, Surgical treatment



Risk of Contamination or Infection During IVF Cycles

Roxana Kargar

Avicenna Fertility Center, ACECR, Tehran, Iran

Abstract

Endometriomas contain several factors thought to be toxic for oocytes, including metalloproteinases, cytokines, free iron, and ROS. However, direct evidence regarding the detrimental effects of accidental follicular fluid contamination is scant and contradictory. Small-scale studies suggest that such contamination may reduce the fertilization rate or the pregnancy rate; thus, inadvertent puncture of the endometrioma must be avoided and if contamination is confirmed, immediate washing of oocyte is necessary.

An iatrogenic injury after oocyte retrieval or inadvertent puncture during oocyte retrieval may cause infection in cases of ovarian endometrioma. Until recently, only 14 cases of infection after oocyte retrieval have been reported in nine studies, although it is possible that this complication is underdiagnosed. However, it is of clinical importance that endometriotic fluid itself can act as a culture medium for pathogens, and because antibiotics do not spread effectively into endometriomas, they may progress to become severely infected. Prophylactic antibiotics do not completely prevent such infections, but if puncture of the endometrioma is suspected, it is necessary to reduce the probability of infection by using antibiotics.

Keywords: Endometriomas, Fertilization rate, Follicular fluid contamination, Prophylactic antibiotics

Evolution of Infertility Treatment: A Journey Through the Time, from the Past to the Future

Afsaneh Mohammadzadeh

Reproductive Biotechnology Research Center, Avicenna Research Institute, ACECR, Tehran, Iran

Abstract

Considering the gradual development in reproductive medicine since Hippocrates with the developments since Louise Brown's birthday in 1978, the advances in reproductive technology, namely sperm and egg donation, intracytoplasmic sperm injection, embryo freezing, surrogacy, gamete intrafallopian transfer, and preimplantation genetic diagnosis are remarkable achievements. Improved take-home-baby rates, fewer multiple pregnancies, lower rates of ovarian hyperstimulation syndrome, and time-lapse technology are the following breakthroughs. This rate of advancement likely reflects our societal drive to develop these technologies, with corresponding improvement in outcomes as described in this issue. The next 40 years are likely to be exciting.

Despite advances in personalized ovarian stimulation, extended embryo culture, pre-implantation genetic testing, and embryo selection, on average, only one-third of all IVF cycles result in a pregnancy. Machine learning is based on the idea that machines can be built to process data and learn on their own, without our constant supervision. Machine learning (ML) is a way of achieving artificial intelligence. ML algorithms use statistics to find patterns in massive amounts of data. Machine learning algorithm has been widely used in clinical research. The present study focuses on making predictions of early pregnancy outcomes in frozen embryo transfer through clinical characters, including age, body mass index (BMI), endometrial thickness (EMT) on the day of progesterone treatment, good-quality embryo rate (GQR), and type of infertility (primary or secondary), serum estradiol level (E2) on the day of embryo transfer, and serum progesterone level (P) on the day of embryo transfer.

In the post-genome era, while analysis of mRNA expression remains as the technique of choice to elucidate mechanisms of function and regulation in ovarian tissue, the use of proteomics is still relatively limited. Although genomics provides valuable information on certain biological functions, the proteome is the complete representation of proteins expressed by a genome. In the last decade, growing interest in proteomic approaches in gynecology has aimed to (i) define biomarker profiles for appraisal of oocyte quality to improve success rates in in vitro fertilization (IVF), (ii) limit the complications of high-risk pregnancies, (iii) create proteomic maps for biomarker identification, and (iv) fine-tune ovarian tissue-engineered models.

Keywords: Artificial intelligence, IVF, Machine learning algorithms, Proteomics

Effects of Adjuvant Growth Hormone Therapy on Poor Ovarian Responders in Assisted Reproductive Technology

Simin Zafardoust [1], Soheila Ansaripour [2], Atousa Karimi [2], Hossein Hosseinirad [1], Mina Ataei [2,3]

1. Avicenna Fertility Center, Avicenna Research Institute, ACECR, Tehran, Iran
2. Reproductive Biotechnology Research Center, Avicenna Research Institute, ACECR, Tehran, Iran
3. Department of Obstetrics and Gynecology, Social Determinants of Health Research Center, School of Medical Sciences, Alborz University of Medical Sciences, Karaj, Iran

Abstract

Objective: The purpose of this research was to evaluate the effect of adjuvant growth hormone (GH) therapy in antagonist protocol for improvement of ovarian response and clinical outcomes of women with poor ovarian response.

Materials and Methods: This clinical trial was a single-center study, controlled with equal randomization, which was carried out at Avicenna Fertility Center, Tehran, Iran. Totally, 118 patients were randomly allocated to either the intervention or the control group. The intervention group received GH and gonadotropin in gonadotropin-releasing hormone (GnRH) antagonist protocol (GH/GnRHant), while the control group received gonadotropin in GnRH antagonist protocol (GnRHant).

Results: The results revealed that the number of days of gonadotropin administration significantly decreased (p=0.040) in the GH/GnRHant group compared to the GnRHant group. Also, our study findings showed that the number of top-quality day 3 embryos and clinical pregnancy rate were higher in the GH/GnRHant group (p=0.007) compared to the GnRHant group (p=0.036). However, there was no significant difference between the two groups in terms of number of received gonadotropin ampoules, number of retrieved MI and MII oocytes, chemical pregnancy rate, ongoing pregnancy rate, and live birth rate.

Conclusion: These results suggest that adjuvant GH therapy in antagonist protocol in women with a history of poor ovarian response is effective to decrease the number of days of received gonadotropin ampoules and improve pregnancy rate.

Keywords: Antagonist protocol, Assisted reproductive technology, Growth hormone, Ovarian stimulation, Poor ovarian response

Laparoscopic Management

Alireza Chamani

Avicenna Fertility Center, ACECR, Tehran, Iran

Abstract
Any increase in end-tidal carbon dioxide tension (PET CO_2) over 25% and/or occurring later than 30 minutes after the beginning of peritoneal insufflation suggests CO_2 subcutaneous emphysema which is the most frequent respiratory complication during laparoscopy.
Peritoneal insufflation induces alteration of hemodynamics, characterized by decreases of cardiac output, elevations of arterial pressure, and increases of systemic and pulmonary vascular resistance. Hemodynamic changes are accentuated in high risk patients. The pathophysiologic hemodynamic changes can be attenuated or prevented by optimizing preload before pneumoperitoneum and by vasodilating agents, alpha 2- adrenergic receptor antagonists, high doses of opioids, and B-blocking agents.

Keywords: End-tidal carbon dioxide tension, Peritoneal insufflation, Pneumoperitoneum, Systemic and pulmonary vascular resistance

Uterine Anomalies and Recurrent Pregnancy Loss

Shahrzad Ansari

IVF center, Mehr Hospital, Tehran, Iran

Abstract

The incidence of uterine anomalies in the general population is approximately 1%, and about three-fold higher in women with recurrent pregnancy loss (RPL) and poor reproductive outcomes. Subseptate uterus is the most common uterine anomaly in women with RPL and first trimester recurrent pregnancy loss and may predict poor pregnancy outcome if incidentally diagnosed at the early stage of a viable intrauterine pregnancy. The association between RPL and a subseptate uterus has been attributed to decreased connective tissue in the septum. An arcuate uterus (intrauterine indentation of <1 *cm*) is found in 17% of women with recurrent miscarriage (91 compared to 3.2% in the general population).

Transvaginal sonography (TVS) is usually the initial investigation tool but the such assessment can be improved by using three-dimensional (3D) ultrasound. TVS allows accurate and rapid characterization of the uterus, including its size and position as well as the presence of anomalies such as a duplicated cervix, duplex uterus, septate, or unicornuate uterus. The ability to visualize both the uterine cavity and the fundal uterine contour on a 3D scan facilitates the diagnosis of uterine anomalies and enables differentiation between septate and bicornuate uterus. Hysteroscopy offers the best and the most direct assessment of the uterine cavity. During the procedure, intracavitary structures can be directly visualized. Miscarriages seem to be an inevitable by-product of human reproduction and are not always correctable. Thus, surgical intervention should be carefully considered and based on the patient's clinical history, and not merely as an attempt to correct all anatomic uterine defects.

Keywords: Arcuate uterus, Hysteroscopy, Recurrent pregnancy loss, Subseptate uterus, Transvaginal sonography, Uterine anomalies

Importance of Teamwork in Infertility Treatment

Fatemeh Hajibabaee

School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran

Abstract

Effective teamwork and interaction across extended clinical area are essential for successful outcome of the treatment processes. It should be recognized that infertility treatments require a teamwork and communication between various specialties. Treatment of infertility by a team of specialists is likely to increase the effectiveness and efficiency of treatment and is known to develop patient satisfaction.

Group responsibility places the ground for increasing the rate of conception and achievement by the treatment group. Group work needs complete management which recruits all specialties available. Since in the Constitution of Iran the concept of accountability and responsibility has been defined for the treating physician, it seems essential to demonstrate team accountability in multifactorial treatments. With regard to the rapid progress of health science and importance of involvement of modern technologies, it cannot be expected from the physician to be able to identify all treatment procedures; the physician can only take all the responsibility for the treatment of the patient.

The necessity of interdisciplinary cooperation among different specialists in assisted reproductive technologies for treatment of infertility is further emphasized by the need in precise control of ovulation, prevention of hyperstimulation, and treatment of immunological defects in management of recurrent spontaneous miscarriages. Effective diagnosis and treatment of infertility seems difficult if these elements are ignored; it has been shown that the professional teamwork cannot be fulfilled unless thorough management protocol for treatment is provided.

In such protocols, psychosocial and emotional dimensions of treatment should not be disregarded as they are significant aspects for increasing the quality of care. Unfortunately, clinicians do not have adequate time to consult with clients. Therefore, these problems should be solved through teamwork and especially with the assistance of nurses and midwives.

Keywords: Emotional dimensions, Infertility treatment, Psychosocial dimensions, Teamwork

Coagulation Factor Deficiencies and Recurrent Pregnancy Loss

Nastaran Teimouri

Iran University of Medical Sciences, Tehran, Iran

Abstract

Couples who have had a pregnancy loss are facing two major concerns, namely the cause of pregnancy loss and the risk of recurrence. Although recurrent pregnancy loss is an important problem in women's health, there are many unsolved questions regarding etiology, evaluation, and management of such disorder. Thrombophilia and fibrinolytic factors are one of the hypothesized mechanisms.

Thrombosis in spiral arteries and the intervillous space on the maternal side of the placenta can impair adequate placental perfusion and the resulting abnormalities of the uteroplacental circulation may cause fetal loss, intrauterine growth restriction, placental abruption or pre-eclampsia. However, such association is still not well-recognized and there is a large and contradictory literature on this relationship. The issue is discussed in detail in this presentation.

Keywords: Fibrinolytic factors, Placenta, Recurrent pregnancy loss, Thrombophilia

The Significance and Role of Patient Education in Infertility Treatment

Fataneh Nazari

Avicenna Fertility Center, Avicenna Research Institute, ACECR, Tehran, Iran

Abstract

Patient education is the development of educational processes for individuals and families regarding diagnosis, treatment, and/or rehabilitation. Therefore, the goals of patient education are consistent with different levels of prevention, and all members of the healthcare team must participate in education. With the increase of patients' lawsuits against the treatment group, the need to inform patients about their rights and their role and participation in treatment becomes apparent. The Patient Bill of Rights ensures that patients receive complete and up-to-date information.

Increasing patients' self-care ability, reducing demands to medical services, reducing treatment costs imposed on families and society, better follow-up and implementation of medication and diet orders, reducing anxiety and increasing patient satisfaction are some benefits of patient education. Also, the accreditation of medical centers requires evidence of patient education to improve behaviors.

Patient education is a communication process that is established by the interaction of the health care provider and the patient. The health care provider must know the principles and techniques of education in order to be able to take the full responsibility of education. Counseling methods and modifying the patient's behavior are effective in acquiring healthy behaviors. Therefore, to educate the patient, it is necessary to have scientific knowledge and practical skills, and to be familiar with the principles of effective communication, teaching methods and techniques, and counseling and guidance. Education is providing opportunities for learners to learn. Therefore, learning is the goal and education is the means to achieve this goal. Learning can be categorized as formal and informal. Most of the education to the patient is informal. Education is most effective when it responds to the needs of learners. Knowledge of how to examine the needs of learners and skill in using effective communication methods for effective teaching in terms of time and place and the use of educational aids are significant factors in teacher education. The teacher must have the power to design and organize the educational program. The balanced personality along with the scientific and practical mastery of the teacher makes him or her valuable and credible.

Each student has his or her own abilities and has different issues and problems and activities, so the effect that the teacher has on each student is different. Education is not only for illiterate or low-educated people, because even people with a high level of education do not know enough about health-treatment issues or do not have correct health behaviors. The teacher should use words that the patient can understand. Having a high education cannot be the reason for a person's familiarity with medical terms.

The patient's prior knowledge and experience are effective in planning for education. The duration of training is determined based on the ability of learners to participate and cooperate in training. Patient education can be beneficial when applied consistently. In order to meet the educational needs of the patients and their family, multiple stages of the nursing process (examination, diagnosis, planning, implementation, and evaluation) are used, taking into account the principles of education and learning. Educational design includes 4 stages: (1) determining the goals of training, (2) checking the conditions of training, (3) determining the resources of training, and (4) checking the effectiveness of training. Educational goals facilitate the movement path, teaching-learning process, and evaluation. Educational goals are placed in 3 cognitive (knowledge), emotional (motivation) and psychomotor (practical skills) areas. The three areas mentioned overlap and influence each other. In teaching the patients and their family, the teacher's role is to help the patient use knowledge and skills in real life, and in fact, it is a combined application of knowledge, skills, and attitudes in three areas of learning. In choosing the teaching method, the topic of the lesson, the ability and number of learners, their attitude and interest, and the duration of the course and educational resources should be considered. When presenting a lesson, one should recognize the situation, combine appropriate methods, and use them for better education. This is known as the mixed method. In order to facilitate implementation and reduce costs, patient education plans in institutions are compiled in a form. This form should contain a review of learning readiness, goals, teaching activities, and content and evaluation.

Keywords: Cognitive aspects, Educational needs, Patient education, Psychomotor aspects

Advanced Sperm Selection Techniques and Their Effect on ART Outcomes

Mahnaz Heidari

Department of Embryology and Andrology, Reproductive Biotechnology Research Center, Avicenna Research Institute, ACECR, Tehran, Iran

Abstract

Male infertility is an increasing and serious medical concern that impairs male reproductive function and affects approximately half of infertile couples worldwide. Multiple factors including the environment, genetics, age, and comorbidities have been associated with impaired sperm function. Clinicians use standard semen analysis to diagnose male reproductive potential and develop treatment strategies. To address bias in sperm quality assessment and enhance the accuracy of analysis, World Health Organization has recommended standardized sperm testing. Assisted reproductive technologies (ARTs) such as in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI) are considered as one of the primary management options for dealing with male factor infertility. Advanced sperm selection techniques are increasingly employed in ART; they have several benefits including being noninvasive, cost-effective, easy to perform, and optimally efficient in selection of high-quality sperm with DNA integrity for fertilization and ICSI. Spermatozoa with DNA damage or physiology defects can lead to failed fertilization, decline in embryo development, and poor clinical outcomes in ICSI program. Therefore, the best preparation method for collection of high-quality sperm is crucial in improving the assisted reproductive outcomes. Routine suitable methods for sperm preparation include density gradient centrifugation (DGC) and direct swim up (DSU). Current management of infertility has been influenced by new technological developments in the reproductive molecular technology field and advanced sperm preparation techniques allow the spermatozoa to be selected based on the surface electrical charge, sperm apoptosis, and morphology and the limitations of routine spermatozoa selection procedures would be overcome. Advanced sperm selection methods have been applied based on sperm surface biomarkers, hyaluronic acid-mediated sperm selection, zeta potential, annexin V staining, magnetic-activated cell sorting (MACS), sperm morphology under ultra-high magnification, and microfluidic devices which mimic the natural biophysical and biochemical environment and provide more high quality sperm in patients undergoing ART treatment. However, these various techniques have both advantages and disadvantages which can be applied based on the individual needs of infertile men and their effects on ART outcome.

Keywords: ART outcomes, Density gradient centrifugation, Direct swim up, In vitro fertilization, Sperm selection techniques

Surgical Management of Polycystic Ovarian Syndrome

Alexey Koval

Department of Operative Gynecology and Oncogynecology, Moscow Regional Scientific Research Institute of Obstetrics and Gynecology, Moscow, Russian Federation

Abstract
Surgical treatment of PCOS is widely used in gynecological practice. The history of the development of treatment techniques has gone from open resection of ovarian tissue to drilling of ovaries. Due to the logically more serious damage to the ovarian tissue with the wedge resection technique, this technique is rarely used nowadays. The most popular method of surgical treatment is the drilling of ovarian tissue. However, should wedge resection really be practically forgotten, and is there really no place for this method in modern gynecological surgery? In other words, is the rapier always better than the sword? Let's discuss our single-center randomized trial.

Keywords: Gynecological surgery, Polycystic ovarian syndrome, Surgical management, Wedge restriction technique

Embryo Donation: Exploring Experiences of Mothers

Mitra Zandi [1], Sahar Dabaghi [1], Narges Bagheri-Lankarani [2], Atefeh Salimi-Akinabadi [1]

1. School of Nursing and Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Department of Epidemiology and Reproductive Health, Reproductive Biomedicine Research Center, Royan Institute for Reproductive Biomedicine, ACECR, Tehran, Iran

Abstract

Background: The efficacy of Assisted Reproductive Techniques (ARTs) or technologies used to treat infertile couples has been approved. One such technique is embryo donation. However, there is insufficient knowledge on the experiences of mothers receiving donated embryos. Thus, the present study was conducted with the aim to determine the experiences of mothers receiving donated embryos.

Materials and Methods: This study was a qualitative conventional content analysis. Mothers receiving donated embryos were selected from among those who were pregnant or were at the postpartum stage using purposive sampling method. The research setting was Royan Institute, Tehran, Iran. A total of 15 interviews were performed with 13 participants. The qualitative data were collected using deep unstructured interviews, and analyzed using the Graneheim and Lundman (2004) method by MAXQDA software v 2010.

Results: Data analysis resulted in 412 open codes that were then categorized into 7 main categories and their subcategories. The main categories were as follows: sociocultural constraint, feeling of insecurity in personal and family identity, protection of personal and family identity, support-related problems, pressure and hardship, and achieving relative tranquility.

Conclusion: The results of this study showed that the mothers who underwent embryo donation experienced feelings of insecurity regarding both individual and family identities, were confronted with socio-cultural difficulties, and faced various pressures. It is suggested that future care plans be focused on the identity crisis of these families and the children resulting from these methods, and that future plans alleviate the socioeconomic pressures resulting from the use of these methods.

Keywords: Assisted reproductive techniques, Embryo transfer, Infertility, Qualitative study

The Effect of Leukemia Inhibitory Factors on the Growth and Survival of Sheep's Follicles in the Ovarian Tissue During Vitrification

Farzaneh Mohammadzadeh [1], Marziyeh Ajdari [2], Afsaneh Mohammadzadeh [3], Lili Safdarian [4], Fardin Amidi [1], Aligholi Sobhani [1]

1. Department of Anatomical Sciences, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
2. Endometriosis Research Center, Iran University of Medical Sciences, Tehran, Iran
3. Department of Reproductive Endocrinology and Embryology, Reproductive Biotechnology Research Center, Avicenna Research Institute, ACECR, Tehran, Iran
4. Department of Gynecology, Shariati Hospital, Tehran University of Medical Sciences, Tehran, Iran

Abstract

One of the experimental programs for fertility protection in women includes cryopreservation. Vitrification of ovarian tissue is one of the cryopreservation methods that uses ultra-rapid cooling rate and high concentrations of cryoprotectant.

To reduce the complications, leukemia inhibitory factor (LIF) was used as a pretreatment in this study. In this study, the ovaries were randomly divided into 8 groups. In NCN (without pretreatment and LIF in culture media), NCP (without pretreatment and with LIF in culture media), PCP (with pretreatment and LIF in culture media), and PCN (with pretreatment and without LIF in culture media) groups, vitrification and reversal were not performed. In the groups of NVN (without pretreatment and LIF in culture media), NVP (without pretreatment and with LIF in culture media), PVP (with pretreatment and LIF in culture media), and PVN (with pretreatment and without LIF in culture medium) groups, vitrification and tissue reversal were performed. All groups were cultured and histological, cellular, and molecular evaluations were performed. The results of the present study showed that LIF in the culture medium reduced the number of abnormal, primordial, primary, and secondary follicles, and DNA breakage compared to the group without LIF (P<0.05) and increased the growth of follicles and expression of GDF9, BMP, AMH, KITLG genes (P<.0.05). The use of LIF pretreatment before vitrification and melting of sheep ovary tissue in its culture medium reduces the damage caused by it and increases the growth and development of ovarian follicles while maintaining their function.

Keywords: Growth and development, Leukemia inhibitory factor, Ovarian follicle, Vitrification

Omics Technologies and Sperm

Naser Amirjannati

Department of Andrology and Embryology, Reproductive Biotechnology Research Center, Avicenna Research Institute, ACECR, Tehran, Iran

Abstract

Male infertility is a heterogeneous disorder accounting for 50% of cases of infertility among couples. Occasionally, its diagnose remains incomplete or unknown. Personalized medicine is a new approach in clinical assistance, providing an approach for prevention, diagnosis, and treatment tailored to each patient. The omics technologies enhance the knowledge in the human reproduction field, provide deeper insight in male gamete and the molecular origin of infertility.

The identification of novel molecules involved in sperm function and using them as biomarkers may provide a new diagnostic tool and improve sperm selection techniques. Personalized medicine promises to be both a diagnostic and therapeutic tool in the clinical management of male infertility, providing a new medical approach toward individualization of infertility treatment.

Keywords: Biomarkers, Diagnostic tool, Male infertility, Omics technology, Personalized medicine

Optimal Time Interval at Different Stages of Oocyte Microinjection and Embryo Transfer Process

Elham Hosseini

Department of Obstetrics and Gynecology, Mousavi Hospital, School of Medicine, Zanjan University of Medical Sciences, Zanjan, Iran

Abstract

Oocyte maturation is both the cytoplasmic maturation and nuclear maturation. These two phenomena are important key mediators for fertilization and induction of early embryogenesis, and thus can provide the basis for implantation, the beginning of pregnancy, and the normal development of the fetus. Oocyte maturation is induced by increasing LH hormone in normal cycles or hCG injection in ovulation stimulation cycles. Since most oocytes are not fully matured after ovarian puncture in assisted reproductive cycles, insemination should be delayed to allow enough time to complete the maturation process, especially cytoplasmic maturation, to optimize fertilization, embryo development, and clinical outcomes.

On the other hand, if sperm injection or fertilization does not happen in a suitable period of time, the unfertilized egg undergoes a time-dependent quality loss in a process called postovulatory oocyte aging, which is the main cause of fetal growth disorders and parthenogenesis. In assisted reproductive techniques, strict adherence to protocols, schedules, and optimal laboratory conditions are necessary in order to maintain gamete fertilization potential and improve embryo developmental competence during laboratory manipulations. Based on the daily workload, the intervals between the various stages of the in vitro fertilization process in embryology laboratories vary; there is no agreed standard for the duration between the stages of hCG administration or oocyte collection and the subsequent stages of short-term incubation versus long-term incubation of the human oocyte and cumulus cells (CCs) in laboratory conditions before ICSI, and the interval between removal of cumulus cells and the start of the ICSI process.

There is clinical concern about the effect of these intervals on the outcomes of assisted reproductive cycles. All this information is very important to efficiently plan the daily routine of an IVF laboratory and to define appropriate key performance indicators (KPIs).

Keywords: Embryo transfer, HCG injection, Human oocyte and cumulus cells (CCs), Key performance indicators (KPIs)

Legal Aspects of Fertility in Patients with Advanced Age

Mohammad Kazemian

Ebnesina Hospital, Tehran, Iran

Abstract

Introduction: One of the main concerns of treatment teams at infertility treatment centers is providing treatment for infertile couples at advanced age or couples with underlying diseases and the management of such problems. Obviously, the approach in communicating with the couple and especially the wife is of serious importance. Obtaining informed consent based on the current laws of the country in compliance with the principles of professional medical ethics relies on two aspects:

1- Obtaining consent: ensuring that the patient is aware of the type of treatment, the method, the drugs used, the duration of hospitalization, and the required facilities.

2- Obtaining acquittal: ensuring that the patient is aware of possible complications caused by therapeutic or diagnostic intervention.

Discussion: The medical team and the attending physician must be confident about the necessary care facilities and equipment and apply the most appropriate and up-to-date medical methods in accordance with scientific and technical standards; moreover, they should take the full responsibility during their activity. It is obvious that the establishment of the mentioned conditions, which can only be achieved in a direct conversation and a proper relationship between the physician and the patient, depends on relaxed state of the patient and of course the treating doctor in the process of performing therapeutic interventions besides the deep understanding and tolerance of patient in facing with possible complications; therefore, the number of patients complaints and legal conflicts will be significantly reduced.

Conclusion: The status of the wife is the fundamental concern in the treatment contract since she is the receiver of treatment and she is the one facing the probable complications of pregnancy; therefore, her eligibility and mental capacity is important to make a decision and her spouse can only play a role as a witness; in other words, his opposition or the need for his consent cannot have an impact on the wife's decision.

Keywords: Advanced age, Consent and acquittal, Fertility, Medical ethics

Artificial Intelligence in IVF Laboratory

Danilo Cimadomo

GeneraLife IVF, Rome, Italy

Abstract
Artificial Intelligence (AI) is a current hot topic in IVF although the first model of an artificial neuron dates back to 1943, 35 years before Louise Brown was born. There are mainly four reasons why AI is needed in IVF laboratories; it is helpful in standardized and reproducible assessment of embryo which is still highly subjective at present, empowering data analysis in the context of clinical and academic research in embryology to generate objective and reliable evidence, automated traceability, quality assurance and quality control to especially reduce the workload in the IVF clinics which is currently increasing due to systematic blastocyst culture, freeze-all and PGT practices. The integration of several softwares in a digital ecosystem will certainly boost the key performance indicators in generation and real-time control across several IVF clinics. The previous concept of lab on a chip is not far from reality anymore. It is expected that in the future, technical skills might become less relevant in an IVF lab, but the mental workload would instead increase, and embryologists (as well as other key IVF professionals) may move towards a leading role in multidisciplinary teams that will encompass bioengineers, data scientists, and bioinformaticians as well.

Keywords: Artificial intelligence, Blastocyst culture, IVF laboratory, Technical skills

Why Do Euploid Embryos Fail to Implant?

Danilo Cimadomo

GeneraLife IVF, Rome, Italy

Abstract

Preimplantation genetic testing (PGT) in experienced clinics allows higher predictivity of blastocyst competence with no impact on the cumulative live birth rate (CLBR) per cycle. As reported by blinded non-selection studies, when whole chromosomal non-mosaic aneuploidies are investigated in trophectoderm (TE) biopsies, blastocysts diagnosed as euploid may implant in up to 65% of the cases, while aneuploid karyotypes predict lethality in >98% of the cases. Other than technical errors, euploid-aneuploid mosaicism with prevalence of nearly 5% represents the main limitation of PGT. Yet, attempting at diagnosing it based on intermediate copy numbers (ICN) from a single TE biopsy analysis does not change the predictive power of dichotomous (euploid/aneuploid) diagnosis. Beyond euploidy, morphokinetics is associated with embryo competence, yet poor morphology (<BB according to Gardner's grading scheme) and day 7 development result in non-negligible LBRs (>10%) and are not hallmarks of incompetence. Omics may unveil future competent biomarkers, but the data must be complemented with more thorough investigations of maternal/paternal characteristics. Moreover, poor or excessive manipulations and some clinical strategies could impact the outcomes in the context of euploid transfers. This talk will summarize all features investigated in the clinical/academic contexts for putative associations with euploid blastocysts' implantation. This knowledge is fundamental to define and implement more efficient (non-)invasive embryo selection tools and clinical workflows in the future.

Keywords: Embryo selection tools, Euploid embryos, Intermediate copy numbers, Preimplantation genetic testing

Pathophysiologic Features of PCOS Patients

Fatemeh Forouzan Fard

Kashan University of Medical Sciences, Kashan, Iran

Abstract
PCOS is a multifactorial disorder that develops due to the combined effects of impaired genetic, epigenetic, and lifestyle factors. All these factors lead to different pathophysiologies (insulin resistance, hyperandrogenism, and low grade inflammation, which further result in complex symptoms of PCOS.
Four phenotypes of PCOS include (1) hyperandrogenism, oligo-anovulation, various polycystic ovary morphologies; (2) hyperandrogenism, oligo-anovulation, normal ovarian morphology; (3) hyperandrogenism, normal menstruation cycle, various polycystic ovarymorphologies; and (4) normal androgen levels, oligo-anovulation, and polycystic ovary morphology. Women with PCOS phenotype A and B are termed classic PCOS patients. Phenotype C patients are considered to be ovulatory patients. Non- hyperandrogenic PCOS patients are considered as phenotype D. Phenotype A is found in 44-65%, phenotype B in 8-33%, phenotype C in 3-29%, and phenotype D in 0-23% of cases.

Keywords: Hyperandrogenism, Pathophysiologic features, Phenotypes, Polycystic ovary syndrome

Tips and Tricks for Trophectoderm Biopsy: Technique, Timeline, Stage, and Quality

Majid Tarahomi

Laboratory for Reproductive Biology, Center for Reproductive Medicine, Amsterdam UMC (AMC), University of Amsterdam (UvA), Amsterdam, Netherlands

Abstract

Objective: The gold standard trophectoderm (TE) biopsy method has not been established yet as it is strongly subjective to the high technology tools, technician skills, embryo quality, and day of biopsy. The practical tricks and tips may maximize obtaining the reliable result and live birth after trophectoderm biopsy.

Materials and Methods: The review of evidence was conducted by computerized literature search in order to find publications reporting any findings about trophectoderm biopsy of human preimplantation embryo.

Results: Currently, two main strategies for TE biopsy are used: a) hatching-based strategy including the zona pellucida (ZP) opening on day three or four and the same-day morning opening, and B) the simultaneous ZP opening and TE cell retrieval strategy. The first strategy is also called herniation-based biopsy which requires a pre-drilled opening in the ZP to allow the trophectoderm cells herniate out. Opening can be performed at cleavage stage (day 3) or morula (day 4) or blastula stage (day 5/6/7). The second strategy is also called non-hatching-based biopsy in which the ZP is opened instantly before the biopsy. Each strategy has several advantages and disadvantages; however, it is still not clear which strategy is superior.

Conclusion: There is a controversy about the best time and method to do TE biopsy but it is important to minimize the biopsy time with less harm to the biopsied embryo. To do so, every IVF laboratory has to choose the technique that works best for the lab while different tools should be available to make adjustments when things do not go as planned.

Keywords: IVF laboratory, Preimplantation embryo, Trophectoderm biopsy, Zona pellucida

Advanced Approaches in Male Infertility: From Stem Cell Therapy to Round Spermatid Injection

Hooman Sadri-Ardekani

Department of Urology and Institute for Regenerative Medicine, Wake Forest University School of Medicine, Winston-Salem, NC, USA

Abstract
Azoospermia is defined as the absence of sperm in the ejaculate. Around 1% of the general population suffer from azoospermia. Men who were rendered infertile due to non-obstructive azoospermia, subjected to testicular sperm extraction (TESE), found to be lacking elongated spermatids or spermatozoa, are commonly advised to consider utilizing sperm donation or apply for adoption. It is reported that around 30% of men with non-obstructive azoospermia lack elongated spermatids and spermatozoa but may still produce round spermatids (a less mature form of haploid germ cells) in their testicles. Other patients who lack round spermatids may still have spermatogonial stem cells (SSCs). Using SSC either via auto-transplantation or in vitro spermatogenesis (e.g., in 3D testis organoid system) have not been successful clinically in human but have been tested in other species with limited efficiency. Round spermatids can successfully be used for injection into activated oocytes, a technique known as round spermatid injection (ROSI). So far, this technique has resulted in over 90 births of healthy babies in Japan, and currently, we are conducting the first ROSI clinical trial in the United States.

Keywords: Azoospermia, Male infertility, Round spermatid injection, Spermatogonial stem cells, Testicular sperm extraction

Challenges of Advanced Maternal Age, Infertility, and Donation

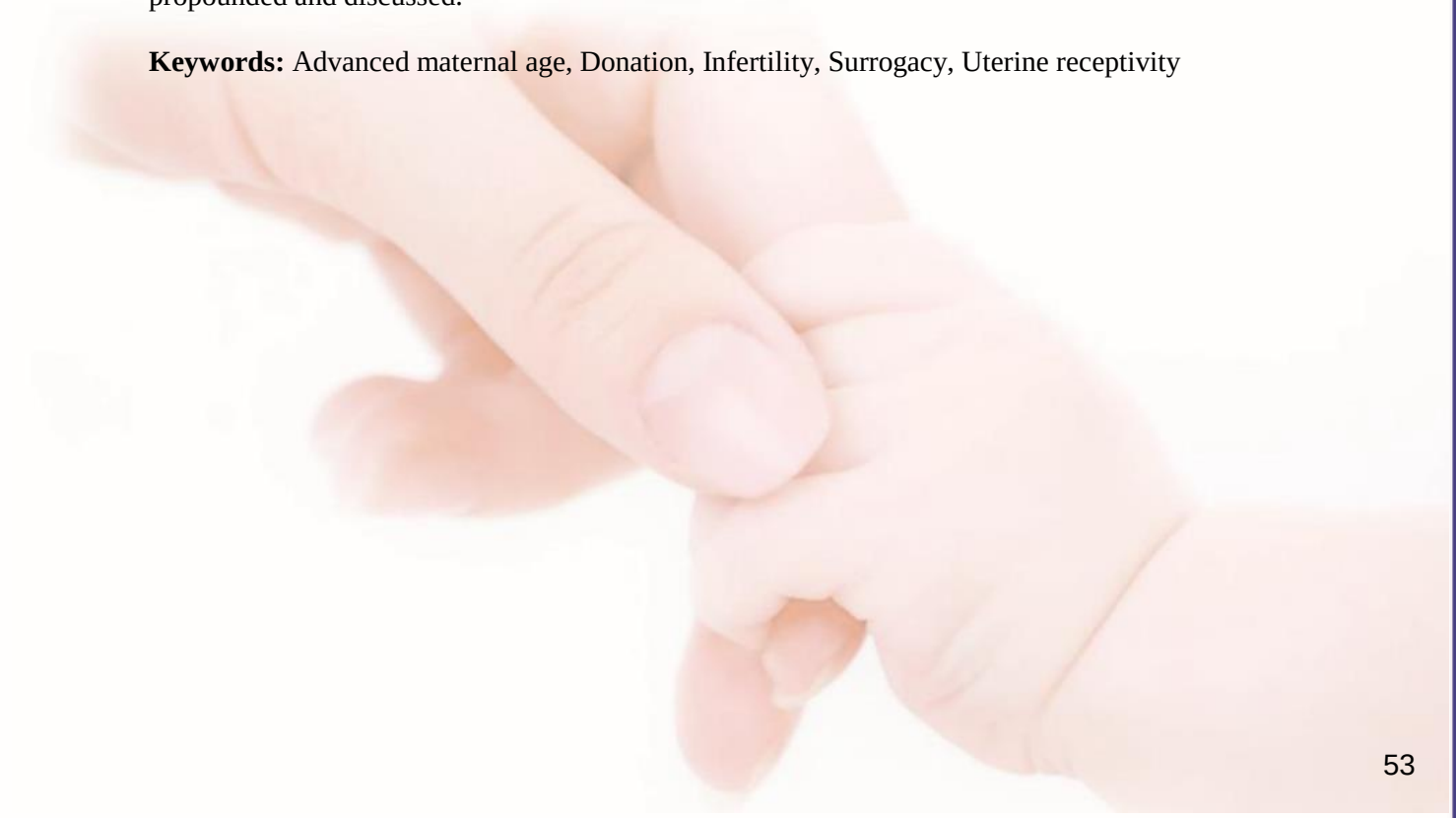
Soheila Ansaripour

Avicenna Fertility Center, ACECR, Tehran, Iran

Abstract

With the increasing participation of women in society in conjunction with their education and employment, a global and common phenomenon is emerging which results in delayed marriage and advanced maternal age for pregnancy. Many studies have shown that fertility decreases due to low ovarian reserve and low uterine receptivity in women over 37 years and especially over 40. Pregnancy complications increase in advanced maternal age, especially in people with underlying diseases including high blood pressure and diabetes. Recurrent pregnancy loss is more common in these women. The outcomes of treatment with IVF, as the most advanced treatment alternative for infertility, depend on the age of women; also, the rate of successful pregnancy in women with their own egg at the ages of 41, 43, 43, and 44 years is on average 7, 6, 5, and 4 %, respectively. On the other hand, the receptivity of the uterus also decreases due to several problems such as adenomyosis and uterine myomatosis. Raising awareness and educating women and even men as an effective prevention method has always been emphasized, but it seems that facing this phenomenon, its challenges, and consequences, especially the concept of aging parents, is largely unavoidable due to social reasons. Studies have shown that once an appropriate treatment is decided on, proper screening is done before starting fertility treatment, and in general, rules, standards, and protocols are established and updated for such patients, the outcomes will be promising and satisfactory. One of the effective treatments for poor responders is the use of donated eggs, which, of course, many couples resist accepting at least at the beginning of the treatment. In this panel, professors in the field of infertility, perinatology, embryology, forensic medicine and lawyers are invited in order to set the ground to have discussions on various aspects of pregnancy in women with advanced maternal age. Professors' opinions about the success of IVF in different age groups, and the legal determination of the maximum age allowed for pregnancy with one's own egg, the possibility of using donation and surrogacy, and the suitable conditions of the donor, the necessary examinations before starting infertility treatments in these people, evaluations of pregnancy complications, and the necessary care during pregnancy in this group of women, the emotional and educational effects of children born to mothers of advanced age, the legal challenges of infertility treatments (donation and non-donation treatments), and professors' opinions about the indications for egg donation and surrogacy, and the role of uterus in women with advanced maternal age for pregnancy besides approaches and practices of other countries in facing such challenges are propounded and discussed.

Keywords: Advanced maternal age, Donation, Infertility, Surrogacy, Uterine receptivity



Uterine Aging and Pregnancy Outcomes in Women of Advanced Maternal Age

Soheila Ansaripour

Avicenna Fertility Center, ACECR, Tehran, Iran

Abstract

Although one of the main factors in successful pregnancy is the number and quality of eggs and age of the woman, AMH levels, and consequently the quantity and quality of eggs are determining factors in the success of an IVF cycle, but recent studies emphasized on the fundamental role of uterus and endometrium in the success of such practices. As a woman ages, there are clear changes in the structure and therefore the function of the uterus. Some disorders such as multiple and large myomas in the uterus or uterine adenomyosis affect the outcome of IVF cycle and the resulting pregnancy. The prevalence of chronic endometritis, salpingitis, hydrosalpinx due to endometriosis or infections or previous pelvic surgery is higher in infertile women of advanced maternal age. On the other hand, changes in cytokines and uterine receptivity have also been shown to be effective in this groups compared to younger women. The possibility of endometrial immune disorders also increases in older ages. This phenomenon has been seen both in old women who got pregnant with their own oocytes or embryos (autologous cycles) and in those who got pregnant with donated eggs. Several studies have shown that the possibility of miscarriage and placental dysfunction increases in facing with disorders such as chronic endometritis, uterine scars, uterine myomas, and adenomyosis. In this lecture, various disorders of the uterus, their effect on the success rate of IVF, and the outcome of pregnancy resulting from them, as well as the available ways of diagnosis and treatment are discussed.

Keywords: Advanced maternal age, Uterine aging, Adenomyosis, Myoma, Endometritis

Application of Artificial Intelligence in Disease Prognosis and Diagnosis

Amir Hossein Ansaripoor

School of Management and Marketing, Curtin University, Perth, WA, Australia

Abstract
Artificial intelligence (AI) is an emerging field that provides enhanced capabilities for decision-making. In addition, with the development of machine learning and deep learning models, artificial intelligence is now being applied to medicine and healthcare. For example, the use of artificial intelligence for the diagnostic evaluation of medical images, such as radiographic images, omics analysis using genome data, and clinical information has been increasing in recent years. To provide an example, a case study including 133 chest X-ray images with different types of lung diseases is introduced here. Convolutional neural network (CNN) and transfer learning were used to anticipate and classify the types of lung diseases. Ultimately, the results were validated using different KPIs that all accurately predict the classes on the test dataset (Precision> 80% and recall> 90%) for all disease types. The introduced methodology can also be applied in other medical fields that involve image processing.

Keywords: Artificial intelligence, Convolutional neural network, Machine learning, Omics analysis, Radiographic images

Clinical Treatment of Idiopathic Oligoasthenospermia: Is There Any Sense?

Sidney Gilna

Division of Urology, Centro Universitário Faculdade de Medicina do ABC (FMABC), Santo André, Brazil

Abstract
Infertility is a medical condition that affects around 15% of the couples. Male factor accounts for 50% of couple's subfertility. Despite advances in the understanding of male infertility, idiopathic sperm abnormalities still account for about 30% of the cases of male infertility. Many approaches have been proposed to treat idiopathic infertility, all of them based on empirical premises. Up to now, no drug therapy has proved to be clearly beneficial to treat idiopathic oligoasthenoteratospermia. Further research on the genetic and molecular defects in spermatogenesis is necessary to improve the diagnosis, to develop specific treatments, and to decrease the number of cases with idiopathic infertility.

Keywords: Drug therapy, Idiopathic sperm abnormality, Male factor infertility, Spermatogenesis

Platelet-Rich Plasma Therapy in Patients with Poor Ovarian Response

Sheyda Jouhari

Avicenna Research Institute, Tehran, Iran

Abstract

The success rate of assisted reproductive techniques (ARTs) has long been less satisfactory although much progress has been made in recent years. Most studies define recurrent implantation failure (RIF) as the failure in achieving pregnancy after at least three embryo transfer cycles in which one or two high quality embryos were transferred. Because the etiology of RIF is not clinically confirmed, targeted therapy is relatively difficult to implement, resulting in many challenges in treatment of RIF patients as there are no proven standard therapies. This indicates the need for alternative approaches in ART cycles. Growing evidence links the effect of intrauterine platelet-rich plasma (PRP) on the endometrium with promising fertility outcomes.

Keywords: Assisted reproductive techniques, Platelet-rich plasma, Poor ovarian response, Recurrent implantation failure

Recurrent Implantation Failure: The Challenges of Embryo Implantation

Juan Garcia Velasco

IVIRMA Global, Madrid, Spain

Abstract
Recurrent implantation failure (RIF) and its management are still part of the most unknown areas in our field. In this presentation, it is shown that the main driver of implantation -and thus, the main cause for RIF- is the embryo, even if it cannot be diagnosed. Other endometrial causes of RIF will be reviewed, such as adenomyosis, the role of hysteroscopy and scratching, the value of transcriptomics in RIF, and the study of microbiome and immunology.

Keywords: Adenomyosis, Hysteroscopy and scratching, Recurrent implantation failure, Transcriptomics

Adenomyosis, Infertility, and Effective Treatment

Roya Padmehr

Avicenna Fertility Center, ACECR, Tehran, Iran

Abstract

Adenomyosis is defined as abnormal implantation of endometrial tissue into the myometrium and is associated with enlarged uterus. The exact etiology of adenomyosis remains unclear with some theories suggesting invagination of the endometrium into the myometrium and others favoring metaplasia of stem cells. Newer theories on the pathophysiology of endometriosis may be leading the way to changing our understanding of adenomyosis as well. Endometriosis has been described as "a fibrotic condition in which endometrial stroma and epithelium can be identified". The hypothesis is that genetic-epigenetic changes play a role in intracellular aromatase activity and result in intracellular estrogen production leading to formation of inflammatory, fibrotic, and endometrial-like tissues outside the uterus. Clinically, adenomyosis commonly manifests with debilitating symptoms including menorrhagia, chronic pelvic pain, dysmenorrhea, and infertility, necessitating treatment. Due to the poorly understood pathophysiology and nature of this disease, management has not been standardized and there are currently no guidelines that prioritize one treatment modality over the other. Throughout the years, adenomyosis has been managed both medically and surgically, sometimes sacrificing the fertility of the patient. Until recently, hysterectomy has been the only definitive treatment for patients with adenomyosis who have completed child-bearing. More recently, other treatment options have been evaluated. Adenomyosis, like endometriosis, is an estrogen responsive condition. This has been the basis for medical treatments that aim to regress the adenomyotic lesions by controlling the hormonal medium. On the other hand, surgical approaches, other than total hysterectomies, include the physical removal of tissue or disrupting the blood flow to the affected area. Surgical techniques that preserve fertility have been developed to avoid hysterectomies in younger women. There are currently no agreed-upon guidelines to follow when managing endometriosis. The National Institute for Health and Care Excellence recommends using a hormonal intrauterine device as the first line treatment for adenomyosis. However, to date, management of adenomyosis remains highly individualized depending on the age, symptoms, and future desire for fertility. In this paper, the current treatment options for adenomyosis are reviewed and their efficacy in controlling the condition is compared.

Keywords: Adenomyosis, Dysmenorrhea, Infertility, Metaplasia, Pathophysiology

Male Fertility Improvement Prior to IVF/ICSI

Saeed Arasteh

Avicenna Fertility Center, ACECR, Tehran, Iran

Abstract

Male factor infertility and subfertility are clinical concepts that do not necessarily reflect an unchangeable situation. A considerable, growing body of evidence indicates that male fertility is co-determined by lifestyle, environmental and psychological factors and their negative influences, to a considerable extent, can be reversed or halted.

Any factors that may affect sperm quality are relevant for any attempt at pregnancy including in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI).

At least 10% of male factor infertility is exogenous and reversible. Professional ethics and good clinical procedure require that systemized efforts be employed to improve fertility and ergo sperm quality by changes in lifestyle and environmental and psychological factors before considering high tech methods.

There are evidences concerning the impact of obesity, tobacco smoking, and alcohol consumption on both natural and ART pregnancies. Males who stopped smoking, after three months had a distinctive improvement in sperm parameters.

Lifestyle factors include acrylamide and glycidamide ingestion, alcohol drinking, bicycling (excessive), hot baths, recreational drug use, physical stress, tobacco smoking (active and passive), and use of vaginal lubricants and gels. Dietary factors include body mass index (BMI), dietary supplements, hormones and endocrine disruptors, and oxidants. Environmental factors consist of heavy metals, (soft) plastics and plasticizers, pollution, and radiation. Medical treatment factors, psychological conditions, and healthy habits are also determining factors in improvement of fertility.

Early systematized efforts to detect and treat any negative influences on male fertility ranging from lifestyle and environment and psychological conditions could provide better chances for natural conception and enhanced success rates of ART. Efforts to improve male fertility may lead to a delay in implementing assisted reproductive treatment in patients designated as suitable cases for such approaches.

Keywords: Dietary factors, Environmental factors, Lifestyle factors, Male fertility

Management of Cesarean Scar Pregnancy

Zahra Panahi

Tehran University of Medical Sciences, Tehran, Iran

Abstract

Cesarean scar pregnancy (CSP) is a potentially dangerous consequence of a previous cesarean delivery. CSP occurs when a blastocyst implants in a microscopic or macroscopic tract on the uterine scar or in the "niche" (or dehiscence) caused by an incision site of the previous CD. Every woman who presents in the first trimester to the obstetrician and gynecologist with a positive pregnancy test and a history of a previous CD should be considered a case with CSP until proven otherwise. The best and first-line imaging modality to diagnose a CSP is transvaginal ultrasound (TVUS). TVUS provides the precise diagnosis in almost all cases without the need of additional imaging modalities. In addition, MRI is more expensive, time consuming, and often delays the diagnosis. There is no universally agreed upon and adopted management protocol for cesarean scar pregnancy (CSP) supported by professional societies in the United States or around the world. After the diagnosis, evidence-based counseling should follow, helping the patient to make a clear decision. Patients diagnosed as well as those suspected of CSP should be referred to the following centers:

1. an experienced center in managing such cases and 2. a center where there is the potential to respond to emergency situations. Such facilities should also be readily available to provide interventional radiology services for their operating rooms. A well-equipped blood bank is also essential. Despite a large number of modalities to terminate a CSP, there is no clear consensus about the best way to be successful. Because there is no single best treatment, one should choose the one with the least complications and gain experience with that approach.

Keywords: Cesarean delivery, Cesarean scar pregnancy, Complications, Transvaginal ultrasound

Postoperative Care After Laparoscopy: Basic, Advanced, Therapeutic, and Diagnostic Laparoscopic Surgery

Bahareh Abbasi

Avicenna Fertility Center, ACECR, Tehran, Iran

Abstract

One of the most important nursing interventions in caring for patients who have undergone laparoscopic surgery is encouraging the patient to get out of the bed as soon as possible and to keep coughing. The practice is helpful in releasing the gases related to the laparoscopic operation infused into the patient's abdomen and pelvic area.

After the physician's prescription of diet, the liquid diet is started first, and by checking the tolerance of patient, in case that intolerance, nausea, and vomiting are experienced, the patient will be asked to lie on her left or right side to prevent aspiration and the doctor should be informed about the condition. Afterwards, generally a soft food and light diet is recommended for at least two bowel movements.

Appropriate control and recording of absorption and excretion of liquids and secretions is done by the nurse which will greatly help in examining the clinical condition of the patient. Careful examination of patient connections, including (foley) catheter tube, drainage bag, angiocath is also important in nursing care. In case of using urine drainage, the dressing should be changed if necessary. Based on the laparoscopic surgery process, the patient is positioned in a lateral position at an angle of 45 degrees, which helps to improve the breathing condition and reduce the pain in the operation area.

The beginning of oxygen therapy is done immediately in the inpatient department. This procedure causes the release and absorption of carbon dioxide gas and reduces complications. Using a pneumatic system for the patient while resting on the bed after surgery will prevent possible long-term complications such as deep vein thrombosis.

Training the patients before discharge from the hospital and explaining about the warning signs such as redness and swelling of the legs, discharge of pus from the surgical site, nausea and vomiting, shortness of breath, severe pain, and obstructed defecation is all part of the nursing care. Also, nurses advise the patients to consume a lot of liquid and soft food for at least two regular bowel movements and use abdominal binder and compression stockings during daily activities after discharge from hospital and laparoscopic surgery.

Keywords: Abdomen, Laparoscopic surgery, Oxygen therapy, Pelvis, Postoperative care

ART in Severe Forms of Endometriosis

Irina Ershova

Department of Operative Gynecology and Oncogynecology, Moscow Regional Scientific Research Institute of Obstetrics and Gynecology, Moscow, Russian Federation

Abstract

Endometriosis is one of the main causes of infertility and, according to many authors, can account for 50% of infertile cases. There are various forms of endometriosis including adenomyosis, peritoneal, infiltrative endometriosis, endometriotic cysts, and therefore there can be no single approach to overcome infertility such cases of endometriosis. In addition, individual management of each patient is necessary based on age, ovarian reserve status, characteristics, and extent of endometriosis.

Restoration of fertility by surgical methods and hormone suppression therapy in selected patients with endometriosis are effective and eliminate the use of the IVF procedure. On the other hand, these methods, if ineffective, can worsen the effectiveness of programs as a result of aggravation of the influence of the age factor and a decrease in the ovarian reserve due to surgical trauma to the ovaries.

The first step in treatment is to determine the possibility of experiencing spontaneous pregnancy after surgical treatment of endometriosis, the advisability of prescribing hormone suppression therapy, and the criteria for switching to ART programs, especially in women with severe forms of endometriosis.

Keywords: ART programs, Endometriosis, Hormone suppression therapy, Ovarian reserve

Does Endometrial Scratching Increase the Probability of Live-Birth in Women Undergoing IVF/ Embryo Transfer?

Ameneh Lahouti

Mom Fertility and Infertility Center, Tehran, Iran

Abstract

Endometrial scratching has been suggested to improve the probability of embryo implantation and, therefore, pregnancy, in women undergoing IVF. It is proposed that the mechanical disruption of the endometrium results in a favorable inflammatory response, increasing the endometrial receptivity by the release of growth factors from the uterine tissue or by changes in its cell structure.

Although some earlier studies have cast doubt on the efficacy of endometrial scratching, it is still commonly available and offered to IVF patients as an add-on treatment. However, the practice has been proved ineffective in a large-scale randomized trial of more than 1000 women which was performed at 16 UK centers from 2016 to 2019.

The population of the current study was clearly defined and is different from those in several earlier trials, some of which included patients with unsuccessful previous IVF treatments and is by far the largest and most conclusive study in women undergoing first IVF treatment.

The findings conclusively indicate that there was no difference in the rate of biochemical pregnancy, ectopic pregnancy, ongoing pregnancy, clinical pregnancy or multiple pregnancy between the two groups and the practice of scratching should no longer be implemented. Those who had endometrial scratching before their first IVF treatment were found to be not more successful than the control group receiving routine treatment.

In conclusion, endometrial scratching was not associated with any improvement in live birth rate, which is in line with the results of previous trials performed on women with recurrent implantation failure, undergoing fresh or frozen embryo transfer cycles.

Keywords: Embryo transfer, Endometrial receptivity, Endometrial scratching, Live birth

Treatment of Infertility: Struggle or Convergence of Knowledge, Expediency, and Nature

Alireza Milanifar

Avicenna Research Institute, ACECR, Tehran, Iran

Abstract

Every day that passes, doctors gain more knowledge and ability in treating patients' diseases and problems, including infertility, and of course, more questions arise as to whether interfering with the so-called natural processes, including childbearing and pregnancy, can be performed without restrictions.

Specialists can now conceive a 57-year-old woman and her 65-year-old husband using their own stored gametes or gametes from a third party, with or without taking the advantage of surrogate pregnancy.

However, further discussion on the procedure seems pointless in case of medical advancement and patient's satisfaction and desire to proceed with the treatment. But if we think about the fact that a child who is born will have parents who are like his grandfather and grandmother when he/she goes to school at 7 years old, more contemplation and prudent decision making is required to manage the unforeseen consequences. Yet, the fact that a woman at the age of 55 can endure pregnancy and childbirth and have a healthy life should not be neglected.

In this way, in the application of infertility treatment, the development of regulations encompassing medical ethics, the rights of couples seeking treatment, and the interest of the resulting child should be taken into consideration in such a way that a balance is established between the right to have children and the right to welfare which is just the beginning of the long road. Accordingly, determining the maximum age for couples seeking treatment is a defensible argument, and of course this limit should be considered for both partners seeking medical treatment.

On this basis, the full age of 49 years for women and slightly more than that for men should be considered the maximum age of childbearing. For the time being, the World Health Organization (WHO) similarly recommends the age of 49 as the maximum natural reproductive age for women.

Keywords: Infertility treatment, Reproductive age, Stored gametes, World Health Organization

Common Complications After ICSI

Maryam Takallou

Avicenna Fertility Center, ACECR, Tehran, Iran

Abstract
In patients undergoing infertility treatment, there may be complications after the operation. The side effects can range from mild to severe complications including OHSS (ovarian hyperstimulation syndrome), bleeding, ovarian torsion, EP (ectopic pregnancy), and drug allergy.
OHSS mostly occurs in cases with polycystic ovary syndrome (PCOS) which can cause symptoms such as pain, shortness of breath, decreased urine output, etc. Moreover, ovarian torsion also happens more often in these cases due to enlarged ovaries.

Keywords: Enlarged ovaries, Infertility treatment, Ovarian torsion, Polycystic ovarian syndrome

Sexual Health and Infertility

Haleh Maleki

Sexual Health Clinic, Avicenna Fertility Center, ACECR, Tehran, Iran

Abstract

Sexual dysfunction is a problem in sexual desire, arousal, or orgasm of patients. The prevalence of the disorder in men is about 30% and in women 40%. Various studies have shown that the disorder rate increases significantly in couples who are infertile as well. Since the priority of treatment in infertile couples is treatment of infertility and achieving pregnancy in women, in most cases, the sexual problems of infertile patients are completely ignored or their management is incidental to the main treatment. Ignoring sexual problems until the end of the infertility treatment can leave long-term effects on the life of the couple which will be continuous even after the infertility treatment. Some sexual problems will be ameliorated when the infertility treatment starts, but some of them are exacerbated after the end of treatment or even after the birth of the child. Numerous studies indicate that infertility treatment is associated with stress, mental pressure, and physical pressure. These consequences may damage body image, sexual desire, and induce sexual dysfunction in patients.

In fertile couples, marital relationship promotes the emotional communication of them, but in infertile couples, marital relationship does not result in pregnancy and feelings of failure, disappointment, anger, unfulfillment, and unsatisfaction in partners are the negative outcome of such failure. Also, medical recommendations for having sexual relationship or recommendations to stay away from this relationship for the treatment purposes cause the infertile couples to become emotionally distant from each other. Infertility treatment can cause sexual spontaneity as well as the pleasantness of this relationship to be damaged. Having sexual intercourse for the purpose of reproduction is a huge barrier in strong emotional connection and sexual pleasure of couples.

Sexual problems significantly increase in many cases of infertility, particularly in women, and the researchers report the prevalence of even 100%. According to the results of various studies, it is strongly recommended that all treatment providers consider some factors for the treatment of patients including their sexual health, the importance of taking a detailed history of patients, and if necessary, referral of patients to relevant specialists.

Keywords: Body image, Disappointment, Infertility treatment, Sexual desire, Sexual dysfunction, Sexual health

The Role of Effective Nurse-Patient Communication in Reducing the Stress of Infertile Women

Safoura Soleimani Fakhr, Homa Mahmoudzadeh

Reproductive Biotechnology Research Center, Avicenna Research Institute, ACECR, Tehran, Iran

Abstract

Effective communication is one of the basic components of the nurse-patient relationship, which from the nurse's and the patient's point of view can have different linguistic and non-linguistic indicators, including facial expressions, gestures, tone of voice, etc. Effective nurse-patient communication is associated with improvement in quality of medical services, increased patient satisfaction, and optimal treatment results. On the other hand, numerous studies show the high level of stress and anxiety of infertile couples, and strengthening the effective communication skills of nurses in infertility treatment centers can help reduce the stress of infertile women and improve the process and results of infertility treatment outcomes.

This study was conducted with the aim of determining the indicators and examining the obstacles and facilitating factors in the formation of effective communication between nurses and patients. Three categories of indicators of effective nurse-patient communication, obstacles, and facilitating factors were identified in the thematic analysis of the interviews. Factors such as respect, concentration on treatment, and patience as the patient-related factors and respect, patience, and precision as nurses-rated factors were proposed as indicators of effective communication. Factors such as short answers, loud voice and screaming, and prejudice were expressed by the patients and anxiety, low level of education, and language and dialect differences by the nurses were indicated as barriers to effective communication. Also, factors such as smiling, looking at the patient while answering and explaining specialized medical terms, and calmness and respectful treatment were listed as the components of facilitative effective communication.

Various studies have shown the high level of stress and increased probability of anxiety disorders in infertile couples. One of the ways to reduce the stress of infertile couples is the formation of effective communication between the nurses and the patients. This is achieved through detecting the indicators of effective nurse-patient communication and its barriers and facilitators, based on the context and special requirements of centers and infertility treatment services. Conducting more extensive research and applying their results to train and strengthen the verbal and non-verbal skills of nurses working in infertility treatment centers seems an essential strategy for the improvement of quality of care.

Keywords: Anxiety disorders, Effective communication, Infertile couples, Stress, Treatment outcomes

Pregnancy Outcome in Septate and Didelphys Uterus, and Caesarean Scar Defect

Shideh Ariana

Shahid Beheshti University of Medical Sciences, Tehran, Iran

Abstract

The septate uterus is the most common uterine anomaly. The etiology of uterine septum is not clearly understood but it seems that a defect in canalization of the midline septum between the two mullerian ducts can be one of the causes. The proximity of the septum to the internal os can determine whether the septate uterus is complete or not.

The thickness and composition of the septum, the relative amount of fibrous and muscular tissue, and the degree of vascularization from the adjacent uterine wall may also vary. The diagnosis is typically based on ultrasound findings of two closely separated endometrial cavities and a smooth fundal contour. The septate uterus is more likely to be associated with adverse pregnancy outcome than other uterine anomalies.

Women with septate uterus are at increased risk for spontaneous abortion (21 to 44%) and preterm delivery (12to33%) and the live birth rate ranges from 50 to 72% among such cases. Pregnancy loss after the second trimester can be distinguished from cervical insufficiency because the signs of labor are often present and detectable. The septate uterus is also associated with an increased risk of breech presentation and abruption. Moreover, hysteroscopic septum resection can improve pregnancy outcome.

Uterus didelphys or double uterus is a duplication of the reproductive structures. Uterine didelphys occurs when the two mullerian ducts fail to fuse. The diagnosis is typically made by a combination of ultrasound showing two widely separated uterine horns with a deep fundal indentation and speculum examination showing two cervices. Spontaneous abortion rate of 32% and preterm birth rates of 28% have been reported in women with uterus didelphys. Fetal growth restriction also appears to be increased. Other complications may arise as well such as torn vaginal tissue or having a breech baby which usually requires a C- section delivery. Uterine didelphys is associated with renal agenesis in approximately 25% of cases, which is the absence of one of two kidneys. Metroplasty should be used for women with pelvic pain, recurrent miscarriage, or a history of preterm delivery It seems that abdominal repair of the didelphys uterus is not effective to improve pregnancy outcome as supported by existing data and research findings.

Cesarean section scar niche is the indentation of the myometrium of at least 2 mm or wedge -shaped defect with a depth of >1-2 mm. The term cesarean scar niche or defect refers to the presence of a hypoechoic area within the myometrium in the isthmus with discontinuation of myometrium at the site of previous cesarean section scar. Etiology of niche includes 1) low cervix, 2) incomplete closure of the uterine wall, 3) surgical interventions that may induce adhesion, and 4) patient related factors.

Sometimes, the disorder can be asymptomatic but the main symptoms are 1) post menstrual spotting, 3) dysmenorrhoea, 4) chronic pelvic pain, 5) dyspareunia, 6) subfertility, 7) obstetrical complication, 8) vaginal discharge, 9) cesarean scar pregnancy, and 10) scar dehiscence in future pregnancy.

For its diagnosis, the common procedures such as transvaginal sonography (TVS), saline infusion sonohysterography, HSG, hysteroscopy, MRI, and 3D ultrasonography can be implemented.

Keywords: Cesarean section scar niche, Pregnancy outcome, Septate uterus, Uterus didelphys

Is Surgical Management of Uterine Septum Necessary Prior to IVF?

Mehra Ketabi

IVF Center, Mehr Hospital, Tehran, Iran

Abstract
Septate uterus is the most common uterine anomaly which reduces the rate of successful pregnancy and increases its complications such as abortion, preterm delivery, and abnormal birth presentations. Septum resection before IVF is a debatable issue and there is grade B evidence that supports the procedure of septum resection. There is no unique guideline for diagnosis of uterine septum based on the criteria of ESHRE-ESGE, ASRM, and CUME has different guidelines for septum detection. It seems that septum resection improves fertility results and ongoing pregnancy in IVF patients. Arcuate uterus is considered a normal variation and does not require resection; however, it is significant to differentiate *arcuate from* septate uterus.

Keywords: Complications, IVF, Ongoing pregnancy, Septate uterus, Septum resection

Clinical Applications of AI: Now and Near Future

Giles Palmer

University of Bristol, Bristol, UK

Abstract

The topic of application of artificial intelligence (AI) in ART is investigated in this lecture. While many articles in recent months have been published about AI, this lecture focuses on the deliverable systems that are now present in many IVF laboratories around the world and describes how they can be used in the decision making process that is essential to maintain good success after IVF. As with other medical professions, AI can be used in a number of ways to aid the management and treatment of others in a healthcare setting. A review of AI to grade and rank oocytes, embryos, and even pre-select single sperm for ICSI is presented.

The benefits of having a consistent and objective assessment from within the IVF laboratory to assist the embryologist are highlighted, with a perspective on the near future where all processes will be electronically linked and data driven decisions will be the norm.

Keywords: Artificial intelligence, Clinical applications, ICSI, IVF laboratories

New Horizons in Treatment of Azoospermia

Behrang Abadpour

Avicenna Fertility Center, ACECR, Tehran, Iran

Abstract

It has now been proven that the male factors and female factors play an equal role in couples' infertility. In male factor infertility, the most severe condition is related to primary testicular failure (PTF) and non-obstructive azoospermia (NOA).

At present, achieving fertility in these couples would be successful if minimum number of sperm can be obtained in the testicular tissue through micro-TESE as a revolutionary treatment and subsequently used for ICSI. However, there may be focal spermatogenesis within distinct regions of testis despite having azoospermia. Otherwise, the only available treatment would be donation. However, the strong desire of most patients to have a child who is genetically related to them is an important challenge which has convinced the scientists to focus on the possibility of new treatments with the advance of new technologies.

One of these opportunities that opens up a new horizon is the use of human induced pluripotent stem cells which can be obtained from various origins and also somatic cells of patients and can be differentiated into germ cells in vitro. Currently, obtaining these cells and the factors that cause in vitro differentiation of them are the significant areas of research which shows great promise for treatment of such patients.

Keywords: ICSI, In vitro differentiation, Micro-TESE, Non-obstructive azoospermia, Primary testicular failure

Preparation of Endometrium for Frozen Embryo Transfer

Shahnaz Ahmadi

Iran University of Medical Sciences, Tehran, Iran

Abstract

Despite the worldwide increase in the rate of frozen embryo transfer, the search for the best protocol to prime endometrium continues. Well-designed trials comparing various frozen embryo transfer protocols in terms of live birth rates, maternal, obstetric, and neonatal outcomes are urgently required. Natural cycle, either true natural cycle or modified natural cycle, is superior to hormone replacement therapy (HRT). Regarding the timing of warmed blastocyst transfer and frozen embryo transfer, the evidence suggests the 6th day of progesterone administration, 6 days following the LH surge, and 7 days following the hCG administration are suitable times in hormone replacement therapy, true natural cycle, and modified natural cycle protocols, respectively. Recently, available evidence clearly indicates that in hormone replacement therapy and natural cycles, there might be marked inter-personal variation in measurement of serum progesterone levels with an impact on reproductive outcomes, despite the use of the same dose and route of progesterone administration. Progesterone rescue protocols in patients with low serum progesterone levels one day prior to warmed blastocyst transfer in hormone replacement treatment and natural cycles is an issue which needs further investigation by future studies.

Keywords: Frozen embryo transfer, Hormone replacement therapy, Modified natural cycle, Natural cycle, True natural cycle

Cesarean Scar Defects: Surgical Management

Mina Jafarabadi

Tehran University of Medical Sciences, Tehran, Iran

Abstract

Around 20% of pregnant women undergo cesarean section (CS), and in most regions of the world, CS rates continue to grow. There is still no clear definition of what can be considered a normal physiologic aspect of a CS scar and what is deemed abnormal.

It is reasonable to consider hormone therapy for cesarean section scars as a symptomatic treatment in women who no longer wish to conceive and have no contraindications. In case of failure of or contraindications for medical treatments, surgery should be contemplated according to the severity of symptoms, including infertility, the desire to preserve the uterus, the size of the scar, and residual myometrial thickness (RMT) measurement. Hysteroscopy is considered to be more of a resection than a repair, so women who desire to experience pregnancy should be excluded from this technique if the RMT is <3 mm, where the repair is essential and can be done by only laparoscopy or vaginal approach. Women with cesarean scar defects should be thoroughly educated, based on the available literature, before making any decision on the suitable treatment for them. Because prevention is better than cure, risk factors should be identified prior to ensuring appropriate management.

Keywords: Cesarean scar defect, Contraindications, Hormone therapy, Residual myometrial thickness, Risk factors, Surgical management

The Effect of Various Pre-treatments and Drug Protocols on Oocyte Quality in ART Cycles

Atousa Karimi

Reproductive Biotechnology Research Center, Avicenna Research Institute, ACECR, Tehran, Iran

Abstract

Providing good quality oocytes is one of the most important goals of ART cycles. Various pre-treatments such as OCP, progesterone, coenzyme Q10 (CoQ10), and estradiol inositol and selenium supplementation have been indicated to improve oocyte quality. Different IVF/ICSI protocols (long, short, antagonist) and also ovulation induction drugs such as hCG, GnRH agonist, and dual triggers may influence maturation and quality of oocytes.

New case -control studies show that OCP does not improve ongoing pregnancy and live birth rates in agonist protocols and pre-treatment with OCP in antagonist cycles was associated with lower pregnancy and live birth rates.

Pre-treatment with estrogen pills also did not improve oocyte quality, ongoing pregnancy, and live birth rate neither in agonist nor in antagonist cycles.

Comparisons of pre-treatment with OCP and estrogen pills in antagonist cycles showed no significant difference in ART results.

Pre-treatment with CoQ10 improves egg quality as an antioxidant agent which prevents aging-induced oxidative stress and DNA damage in oocytes. Therefore, CoQ10 potentially increases IVF/ICSI success rates.

Keywords: ART cycles, Coenzyme Q10, Drug protocols, ICSI success rate, IVF success rate, Oocyte quality

Comparison of the Effect of Balanced Diets Based on Modern and Iranian (Persian) Traditional Medicine on the Anthropometric Indices of Fetuses with Asymmetric Fetal Growth Retardation and Their Mothers: A Randomized Clinical Trial

Yalda Rumi [1], Roshanak Mokaberinejad[2], Shahrzad Hashemi–Dizaji [3], Gholamreza Mohammadi-Farsani[4], Seyed Mohammad Riahi[5], Mitra Mehrabani[1]

1. Herbal and Traditional Medicines Research Center, Kerman University of Medical Sciences, Kerman, Iran
2. Department of Traditional Medicine, School of Traditional Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3. Department of Gynecology and Obstetrics, School of Medicine, Iran University of Medical Sciences, Tehran, Iran and Department of Gynecology and Obstetrics, Shahid Akbar Abadi Hospital Clinical Research Unit, Iran University of Medical Sciences, Tehran, Iran
4. Department of Clinical Nutrition, School of Nutrition and Dietetics, Tehran University of Medical Sciences, Tehran, Iran
5. Department of Public Health, Faculty of Health, Birjand University of Medical Sciences, Birjand, Iran and Department of Epidemiology, Faculty of Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Abstract

Introduction: Fetal growth restriction (FGR) is a major public health problem. There is no therapeutic option in cases without any cause for the disorder. Therapists in Iranian traditional medicine use special foods which according to the laws of Persian (Iranian) medicine promote the growth of body during pregnancy and improve the growth of fetuses with FGR. In this study, the effectiveness of a balanced diet containing recommended Persian (Iranian) medicine and a classic balanced diet, for the weight gain of asymmetric FGR fetuses, was compared.

Subjects and Methods: A randomized clinical trial was performed on 64 pregnant women with asymmetric causeless FGR. Patients were randomly assigned to two groups and each group received a balanced diet. Types of food were different in the two groups. Ultrasound was repeated every two weeks. Repeated measures analysis of variance (ANOVA) was used to assess the effect of the intervention on continuous variables in three different measurements including fetal weight, abdominal circumference, and mother's weight.

Results: In this study, although there was no significant difference between macronutrients and micronutrients (after adjusting for magnesium difference), the weight gain of the fetuses in the intervention group was significantly higher than the one in the control group ($p<0.001$); similarly, the abdominal circumference of the fetuses was higher ($p=0.002$). However, there was no significant difference in maternal weight gain in the two groups ($p=0.880$).

Conclusion: Taking into account the previous findings, the potential of treatment via nutrition as a low-complication and non-invasive method should not be ignored in the treatment of FGR.

Keywords: Anthropometric indices, Diets, Fetal growth retardation, Medicine

The Effect of Nutritional Interventions on Reducing the Incidence of Intrauterine Growth Restriction: A Review

Yalda Rumi [1], Shahrzad Hashemi Dizaji [2], Roshanak Mokaberinejad [3], Gholamreza Mohammadi-Farsani [4], Mitra Mehrabani [1]

1. Herbal and Traditional Medicines Research Center, Kerman University of Medical Sciences, Kerman, Iran and Department of Traditional Medicine, School of Traditional Medicine, Kerman University of Medical Sciences, Kerman, Iran
2. Department of Gynecology and Obstetrics, School of Medicine, Iran University of Medical Sciences, Tehran, Iran
3. Department of Traditional Medicine, School of Traditional Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
4. Department of Clinical Nutrition, School of Nutrition and Dietetics, Tehran University of Medical Sciences, Tehran, Iran

Abstract

Intrauterine growth restriction (IUGR) is defined as the failure of embryo to achieve optimal growth of normal range with respect to gestational age and it is one of the major health problems especially in developing countries. The growth of embryo may be affected by several factors, including mother's diet during pregnancy; therefore, nutritional interventions can be effective in reducing the rate of IUGR. The purpose of the current research was to investigate the existing studies and interventions favoring reduction rate of IUGR.

Google scholar, PubMed, and Science Direct were used to browse articles in English from 1980 to present with the terms "Intrauterine Growth Retardation" and its abbreviation "IUGR" in combination with "Nutritional" and "Dietary". Academic database of ACECR at www.sid.ir and Magiran database at www.magiran.com were also searched for Persian articles.

One Persian article and 14 English studies were selected among 65 articles.

In order to prevent IUGR, more emphasis should be placed on protein / energy consumption while examining the mother's diet in terms of these two nutritional requirements. Also, intake of three micronutrients of folic acid, magnesium, and vitamin B12 during pregnancy may influence fetal growth

Keywords: Fetal growth, Intrauterine growth restriction, Micronutrients, Nutritional interventions

First Trimester Determination of Fetal Gender by Ultrasonographic Measurement of Anogenital Distance: A Cross-SectionalStudy

Nazila Najdi [1], Fatemeh Safi [1], Shahrzad Hashemi-Dizaji [2], Ghazal Sahraian [1], Yahya Jand [3]

1. Department of Gynecology and Obstetrics, School of Medicine, Arak University of Medical Sciences, Arak, Iran
2. Department of Gynecology and Obstetrics, Shahid Akbarabadi Hospital, Faculty of Medicine, Iran University of Medical Sciences, Tehran, Iran
3. Departement of Pharmacology, School of Medicine, Tehran University of Medical Science, Tehran, Iran

Abstract

Background: In some patients with a family history of the gender-linked diseases, determination of the fetal gender in the first trimester of pregnancy is of importance. In X-linked recessive inherited diseases, only the male embryos are involved, while in some conditions, such as congenital adrenal hyperplasia, female embryos are affected; hence, early determination of fetal gender is important. The aim of the current study was to predict the gender of the fetus based on the accurate measurement of the fetal anogenital distance (AGD) by ultrasound in the first trimester.

Materials and Methods: To determine the AGD and crown-rump length in this cross-sectional study, 316 women with singleton pregnancies were exposed to ultrasonography. The results were then compared with definitive gender of the embryos after birth.

Results: The best cut-off for 11 weeks to 11 weeks, 6 days of pregnancy, was 4.5 mm, for 12 weeks to 12 weeks, 6 days was 4.9 mm, and for 13 weeks to 13 weeks, 6 days was 4.8 mm.

Conclusion: AGD is helpful as an ultrasonographic marker that can determine fetal gender in the first trimester, especially after 12 weeks.

Keywords: Female, First trimester, Gender, Male, Pregnancy, Sonography

Fertility Outcomes in Patients Referred to a Tertiary Endometriosis Clinic

Khadijeh Shadjoo[1], Atefeh Gorgin[2], Narges Maleki [2], Arash Mohazzab [2], Mina Ataei [2], Maryam Armand [2]

1. Reproductive Biotechnology Research Center, Avicenna Research Institute, ACECR, Tehran, Iran
2. Avicenna Fertility Center, Avicenna Research Institute, ACECR, Tehran, Iran

Abstract

Background: Endometriosis is one of the most common gynecological diseases, affecting approximately 176 million women of reproductive age. There is a growing body of research linking endometriosis to adverse maternal and fetal outcomes. As a result, the goal of this study was to evaluate the relationship between endometriosis and abortion, antepartum hemorrhage (APH), pre-eclampsia, preterm birth, small for gestational age (SGA), gestational diabetes mellitus (GDM), and gestational hypertension (GHTN) in pregnant women with endometriosis referred to endometriosis clinic of Avicenna Fertility Center.

Subjects and Methods: A cross-sectional study was performed on patients with confirmed endometriosis (by clinical and paraclinical evaluation) referred to the endometriosis clinic of Avicenna Fertility Center between the years 2013-2020. All patients who got pregnant during these years were followed prospectively and maternal/fetal complications were collected from medical records or by phone visits.

Results: From 248 patients, 180 patients underwent laparoscopic surgery. In general, 24 pregnancies (12.09%) ended in abortion, 31 patients (12.9%) experienced antepartum hemorrhage and 27 (11.2%) of neonates were admitted in NICU. The frequency of other complications was as follows: GDM =9.27%, SGA=6.45%, prom=6.45%, GHTN=2.01%, pretem labor=1.61%, preeclampsia=0.8%, ectopic pregnancy=0.8%, dystocia= 0.8%, and placental abruption=0.8%. There was no case of stillbirth.

Conclusion: The relatively high rate of hemorrhage and antepartum abortion in pregnant women with endometriosis suggests that endometriosis may be involved in pregnancy complications. Further studies are needed to better understand such association.

Keywords: Abortion, Endometriosis, Fertility outcomes, Hemorrhage

Pregnancy Outcomes in Cases with Endometriosis

Sedigheh Hantooshzadeh

Tehran University of Medical Sciences, Tehran, Iran

Abstract

Endometriosis is a complex and chronic gynaecological condition that affects women of reproductive age. It is associated with pelvic pain, subfertility, impaired health-related quality of life and reduced work productivity. The true prevalence of endometriosis is unknown, although estimated as 2–10% in the general female population and up to 40% in women with subfertility and/or pelvic pain. The pathophysiology of endometriosis is poorly understood and its impact on pregnancy is relatively unexplored. It seems that endometriosis is associated with lower fertilization, implantation, and clinical pregnancy rates in women undergoing in vitro fertilization (IVF).

All of these outcomes were worse with more advanced stages of endometriosis. Endometriosis has been linked with increased inflammation in the peritoneal cavity and higher concentrations of cytokines, growth factors, and angiogenic factors. Other factors implicated include poorer oocyte quality, progesterone resistance, molecular and functional abnormalities in eutopic endometrium, and anatomical distortion of fallopian tubes and ovaries in women with endometriosis; all of the above problems may potentially affect fertility and pregnancy outcomes. The results from the few population-based studies examining the association between endometriosis and adverse pregnancy outcomes are inconsistent. Population based studies in women with endometriosis are challenging to perform, as the condition can only be diagnosed with certainty by laparoscopy. In total, pregnant women with endometriosis are at higher risk of miscarriage and ectopic pregnancy, placenta previa, unexplained antepartum haemorrhage, postpartum haemorrhage, operative delivery, and preterm birth. They also tend to be older and are more likely to be nulliparous in comparison to women without a similar diagnosis.

Most of our findings for pregnancy outcomes are in agreement with the Swedish database study and Chinese study, which demonstrated a higher risk of preterm birth, antepartum haemorrhage, and caesarean section. The early pregnancy complications in our study are similar to the Danish population, showing increased risk of both miscarriage and ectopic pregnancy. The incidence of miscarriage in our study was 12.4% in women with a previous diagnosis of endometriosis compared with 5.4% in those without a diagnosis of endometriosis.

Both these rates are lower than the accepted 15% prevalence rate for miscarriage. The data for our study were obtained from hospital and maternity discharge databases. Only those women who had a contact with the hospital for their miscarriage are recorded in the database. Women who miscarried at home would not be captured by the database and therefore miscarriage rates in both groups are likely to be under-represented. It is difficult to ascertain whether women with a previous diagnosis of endometriosis are more anxious and therefore more likely to attend hospital with miscarriage-related symptoms compared with other pregnant women. Changes in awareness and health-seeking behavior for miscarriage in pregnant women over the last three decades is also likely to influence the recorded prevalence of miscarriage.

The existing data linking endometriosis with hypertensive disorders of pregnancy continues to be controversial. Of the six studies that explored this, the results of two large studies are contradictory. One study did not show any association between endometriosis and either pregnancy-associated hypertension or pre-eclampsia in 200000 women with singleton pregnancies, irrespective of the use of medically assisted reproduction. Another large Swedish database study based on a cohort of 1.4 million women demonstrated a significantly increased risk of pre-eclampsia in women with endometriosis. More recently, a Canadian study demonstrated absence of any association between gestational hypertension/pre-eclampsia and endometriosis. Similarly, no such association was found in the Chinese population, in keeping with the findings in our study. It seems that a key determinant of pregnancy complications is the outcome of a previous pregnancy. Our subset analyses of primigravid women and those who had laparoscopic diagnosis of endometriosis in the last decade demonstrated similar trends and direction of effect, confirming that endometriosis has an adverse impact on pregnancy independent of previous pregnancy outcomes or changes in practice.

Analysis of certain rare outcomes such as ectopic pregnancy, placenta praevia, and stillbirths was compromised by very small numbers in both the subsets, resulting in wide confidence intervals. Another interesting finding was that the odds of preterm birth was similar in primigravid women with and without endometriosis, thereby suggesting that in multipara, an unrecorded previous preterm birth could have been influential in a subsequent pregnancy. In conclusion, endometriosis predisposes women to an increased risk of early pregnancy loss as well as maternal and perinatal complications in ongoing pregnancies.

Keywords: Early pregnancy loss, Endometriosis, Maternal complications, Pregnancy outcomes, Stillbirth

Future Trends in Embryology Laboratories

Ali Sadeghitabar

Avicenna Fertility Center, Avicenna Research Institute, ACECR, Tehran, Iran

Abstract

More than forty-four years have passed since the birth of the first IVF baby in the world. When scientists gave birth to Louise Brown as the first IVF baby about 45 years ago, no one could imagine that in less than half a century the techniques and methods of assisted reproductive technology would advance to such an extent that scientists would be able to perform genetic manipulation, as well as cloning. Today, the main concern is the birth of a healthy child and prenatal screening of babies obtained through assisted reproductive technologies. Considering the techniques of in vitro fertilization and the production of several embryos in an assisted reproductive process, discovering methods that assist in early screening of healthy fetuses that will be able to reach full term pregnancy has been more emphasized.

As a result of increased development of available technologies, it seems that in the future, the evolution of embryology knowledge in IVF centers will take place through two directions; the first method is taking the advantage of molecular methods and techniques in order to identify the best embryo and transfer it to the mother's uterus for early implantation to increase the success rate of treatment cycles. The second strategy is the use of new tools, devices, and technologies that can determine the health of the fetus, its growth and survival in the mother's uterus by carefully examining the molecular and physical indicators of fetal growth and development in laboratory environments. Among such developments, the use of various biological molecules such as soluble human leukocyte antigen‑G (sHLA-G), leptin, and use of OMICS technologies help us in accurate diagnosis and assessment of the health of the fetus.

Moreover, embryo monitoring systems and tools, such as time-lapse systems and the development of medical imaging technologies, as well as upgrading information processing software open up new horizons for the development and advancement of embryology knowledge. Definitely, in the coming years, the actions that used to be a myth for us will be closer to reality and they would be applied in to practice.

Keywords: Embryology laboratories, Fetal growth and survival, Human leukocyte antigen‑G, OMICS technologies

The Prevalence of Myoma in Pregnancy

Soudabeh Kazemi

Guilan University of Medical Sciences, Guilan, Iran

Abstract

The prevalence of myoma in pregnancy is between 1.6 and 10.7%. It is more common in the black race and in older mothers. Longer breastfeeding period and higher parity have a decreasing effect on its prevalence. Changes in fibroid size during pregnancy are affected by various factors such as estrogen and progesterone levels, uterine blood flow, and possibly hCG levels.

During pregnancy, fibroid size remains constant in 50-60% of cases or changes slightly. In 22-32% of cases, increase in size and in 8-27% of cases, decrease in size have been observed. Larger fibroids (more than 5 cm in diameter) increase in size, while smaller fibroids usually remain the same. The average size increase is about 12% and they rarely grow more than 25%. The growth pattern is not linear; it often occurs in the first trimester, and the changes are less in the second and third trimesters.

In the assessment during six months after delivery, in 90% of cases, the fibroids became smaller, and only 10% of them increased in size. In patients who use progestin contraceptives, this reduction in size occurs less. Most pregnancies with fibroids end without any complications related to fibroids. The most common complication of uterine myoma is the painful degeneration of the myoma, and there is also an increase in complications such as miscarriage, preterm labor, placental abruption, improper birth presentation, but usually there are no other adverse pregnancy outcomes. The rapid growth of fibroids in pregnancy with a relative decrease in blood supply leads to ischemia and necrosis (red degeneration). In cases of pedunculated sebaceous fibroids, there is also a possibility of torsion. In general, the size and location of the fibroid are effective in the occurrence of pregnancy complications. The size of more than three centimeters in diameter and the retroplacental location are associated with an increase in the risk of miscarriage, placental abruption, restriction of fetal growth, premature birth, and bleeding. The presence of multiple fibroids is another risk factor for premature birth.

Complications such as fetal death, premature rupture of membrane (PROM), pre-eclampsia, and intrauterine growth restriction (IUGR) do not increase with uterine fibroids**.** In mild to moderate cases, acetaminophen and in case of more severe pain, hospitalization and opioid treatments for a short period of time and NSAIDs are recommended.

In cases with such disorder, the possibility of vaginal delivery is provided for most cases. The indication for cesarean section is based on obstetrical conditions (non-cephalic presentation or lack of progress or closure of the uterine incision in cases of large fibroids). In cases where there is a history of myomectomy, or large myomas have been removed, a planned cesarean section is recommended at a gestational age of 37 weeks to 38 weeks plus 6 days. The management of these mothers is similar to those who have a history of cesarean section.

Keywords: Intrauterine growth restriction, Myoma, Pre-eclampsia, Pregnancy complications, Premature rupture of membrane

Double Stimulation Protocol and Using Multiple-Dose GnRH Antagonist in Patients with Poor Ovarian Response at Avicenna Fertility Center

Farnaz Montazeri, Jaleh Zolghadr, Katayoun Yazdchi, Simin Zafardoust, Zahra Sehhat

Avicenna Fertility Center, Avicenna Research Institute, ACECR, Tehran, Iran

Abstract

Background: Poor ovarian response to ovarian stimulation is a challenging factor in assisted reproductive technology (ART). Various protocols have been found to increase fertility rates in poor ovarian responders (PORs). The purpose of the current study was to compare the efficacy of a conventional multiple-dose GnRH antagonist protocol with double stimulation protocol in women with POR.

Materials and Methods: In this randomized clinical trial, 2 groups of women with POR criteria (30 cases in each group) were included in the study. Their basic characteristics were recorded. One group of patients received high dose of GnRH antagonists for double ovarian stimulation, and the second group received gonadotropins at follicular phase and the luteal phase. The number of oocytes, fertilized eggs and embryos, as well as conception were compared between them.

Results: The average number of eggs received in the conventional method was 2.7 and in the double stimulation group was 3.2 (p=0.90). The number of fertilized eggs was 31 in the conventional protocol and 25 in the double stimulation protocol. The average number of pregnancies that resulted in childbirth was 1.38 in the conventional protocol and 0.96 in the double stimulation group (p=0.018), but in the double stimulation group, 4 pregnancies ended in a birth and only one in the conventional group resulted in a childbirth (p = 0.016).

Conclusion: In this study, there was no significant difference in the number of eggs and blastocytes in the two studied groups. The fetuses in the double stimulation group had more ability to reach full term pregnancy.

Keywords: Blastocyst, Double stimulation protocol, Egg, In vitro fertilization, Infertility, Ovarian stimulation, Poor ovarian response

Nanofibrous Scaffold as a Promising Substrate for Differentiation of Embryonic Stem Cells into Germ-Line Cells

Mina Vardiani [1], Mazaher Gholipourmalekabadi [2, 3], Marefat Ghaffari Novin [1, 4], Morteza Koruji [2, 5], Hamid Nazarian [1, 4]

1. Department of Biology and Anatomical Sciences, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Cellular and Molecular Research Centre, Iran University of Medical Sciences, Tehran, Iran
3. Department of Tissue Engineering and Regenerative Medicine, Faculty of Advanced Technologies in Medicine, Iran University of Medical Sciences, Tehran, Iran
4. Cellular and Molecular Biology Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran
5. Department of Anatomical Sciences, Iran University of Medical Sciences, Tehran, Iran

Abstract

The increasing prevalence of male infertility due to disability in production of functional sperms has remained as a main problem worldwide. The development of a new and reliable procedure for guided differentiation of stem cells toward sperm-producing cells may be a new window of hope for treatment of such infertile males. Accordingly, the purpose of the current study was to investigate whether nanofibrous scaffold (NS) promotes differentiation of embryonic stem cells (ESCs) to germ-line cells. In this study, an attempt was made to study the effects of nanofibrous scaffold on differentiation of ESCs co-cultured with sertoli cells toward germ-line cells. Nanofibrous scaffolds were fabricated by electrospinning. Sertoli cells and ESCs were isolated from NMRI mice. The cells were treated with bone morphogenetic protein 4 (BMP4) to stimulate differentiation of ESCs. The differentiation of ESCs was studied on days 3 and 7 of induction with BMP4. Mechanical and biological properties of the scaffold for sertoli cells and ESCs were then studied *in vitro*. ESCs were cultured on gelatin nanofibrous sheet and then transferred to cell culture plate seeded with sertoli cells.

The cells were fed using differentiation media containing BMP4. The differentiation value of ESCs was then measured after 3 and 7 days by different cellular and molecular evaluations. NS showed a uniform morphology with good biocompatibility for both sertoli cells and ESCs. The ESCs cultured on NS co-cultured with mitomycin C-treated sertoli cells showed higher level of differentiation toward germ-line specific marker genes such as MVH, DAZL, and others. The results showed that more than 50% of the ESCs seeded on NS expressed MVH which was significantly more than those cells cultured on plastic surface of cell culture plate. The ESCs seeded on culture plate showed minimum differentiation. Based on our findings, co-culture of ESCs with sertoli cells on both 3D nanofibrous scaffold and culture plate showed higher level of guided differentiation when compared to those ESCs cultured on NS and culture plate without sertoli cells. This data is consistent with other relevant studies. Culturing ESCs on one side of NS is difficult due to poor mechanical property of nanofibrous sheet.

It is suggested to improve mechanical behavior of NS using cross-linking agents or some blends. It was found that NS significantly increases the differentiation rate of ESCs toward germ-line cells when co-cultured with sertoli cells. Our results are in agreement with other studies showing the positive effects of 3D scaffolds for improving proliferation and guided differentiation of stem cells. Many studies are required to develop a new strategy or factors to increase differentiation of stem cells to a specific cell line.

Keywords: Co-cultures, Embryonic stem cells, Male infertility, Sertoli cells, Spermatogenesis

Endometrium Conditions and Disease and Recurrent Pregnancy Loss

Fatemeh Sarvi

Tehran University of Medical Sciences, Tehran, Iran

Abstract

Recurrent pregnancy loss (RPL) is defined as three or more consecutive miscarriages. The incidence of recurrent miscarriage is about 2-3%. Pregnancy loss may be a consequence of maternal factors affecting the endometrium. Various uterine pathologies, such as thin endometrium, uterine abnormalities, and endometriosis may be the cause for decreased endometrial receptivity. Other etiologies have been proposed but are still considered controversial, such as chronic endometritis, inherited thrombophilia, and luteal phase deficiency (LPD). Over the years, evidence based treatments such as surgical correction of uterine disorders or aspirin and heparin for antiphospholipid syndrome (APS) have improved the outcomes for couples with recurrent pregnancy loss. However, almost half of the cases remain unexplained and are empirically treated using progesterone supplementation and immunomodulatory therapies. This presentation reviews the endometrial factors affecting implantation and recurrent pregnancy loss.

Keywords: Endometriosis, Endometrium, Maternal factors, Recurrent pregnancy loss, Uterine abnormalities

The Effect of Two Different Doses of Vitamin D Supplementation on Metabolic Profiles of Insulin-Resistant Patients with Polycystic Ovary Syndrome: A Randomized, Double-Blind, Placebo-Controlled Trial

Fatemeh Foroozanfard [1], Masoomeh Talebi [1], Mansooreh Samimi [1], Sahar Mehrabi [2], Bita Badehnoosh [3], Mehri Jamilian [2], Maryam Maktabi [2], Zatollah Asemi [4]

1. Department of Gynecology and Obstetrics, School of Medicine, Kashan University of Medical Sciences, Kashan, Iran
2. Endocrinology and Metabolism Research Center, Arak University of Medical Sciences, Arak, Iran
3. Department of Gynecology and Obstetrics, School of Medicine, Alborz University of Medical Sciences, Karaj, Iran
4. Research Center for Biochemistry and Nutrition in Metabolic Diseases, Kashan University of Medical Sciences, Kashan, Iran

Abstract

The current study was conducted to evaluate the effects of two different doses of vitamin D supplementation on metabolic profiles of insulin-resistant patients with polycystic ovary syndrome (PCOS). This randomized double-blind, placebo-controlled trial was performed on 90 insulin-resistant patients with PCOS, aged 18–40, according to the Rotterdam criteria. Participants were randomly allocated into 3 groups to receive either 4 000 IU of vitamin D (n = 30) or 1 000 IU of vitamin D (n = 30) or inactive medicine (placebo) (n = 30) per day for 12 weeks. Vitamin D supplementation (4 000 IU), compared with vitamin D (1000 IU) and inactive medicine, led to reduced fasting plasma glucose (-4.3±8.6 vs. -4.7±7.1 and +0.1±6.7 mg/dl, respectively, p=0.02), serum insulin concentrations (-2.7±2.7 vs. -1.4±4.2 and -0.1±4.1 µIU/ml, respectively, p=0.02), and reduced insulin resistance based on homeostatic model assessment (HOMA) (-0.6±0.6 vs. -0.4±1.0 and -0.1±0.9, respectively, p=0.02). In addition, significant decreases were found in mean of serum triglyceride levels (-10.3±7.3 vs. -3.6±14.5 and +6.9±23.8 mg/dl, respectively, p=0.001), very-low-density lipoprotein (VLDL) (-2.0±1.5 vs. -0.7±2.9 and +1.4±4.8 mg/dl, respectively, p=0.001), total (-14.0±9.5 vs. -6.2±24.0 and +7.1±29.7 mg/dl, respectively, p=0.002), low-density lipoprotein (LDL) (-10.8±8.3 vs. -5.7±21.9 and +6.8±28.2 mg/dl, respectively, p=0.005), and total HDL-cholesterol ratio (-0.2±0.3 vs. -0.1±0.6 and +0.2±0.7 mg/dl, respectively, p=0.003) in the high-dose vitamin D group compared with low-dose vitamin D and placebo groups. Overall, vitamin D supplementation at a dosage of 4000 IU/day for 12 weeks in insulin-resistant patients with PCOS had beneficial effects of glucose metabolism and reduced lipid levels compared with 1000 IU/day of vitamin D and placebo groups.

Keywords: Insulin resistance, Metabolic status, Polycystic ovary syndrome, Vitamin D supplementation

Polycystic Ovaries, Herbal Remedies, and Other New Treatments

Zahra Heidar

Shahid Beheshti University of Medical Sciences, Tehran, Iran

Abstract

Polycystic ovary syndrome (PCOS) is an endocrine disorder that affects one in every 15 women worldwide. This disorder is mainly characterized by increased levels of male hormones (androgens), acne, and hirsutism, and can lead to long-term insulin resistance, miscarriage, or even infertility in women. PCOS is a disorder that can be treated with natural and allopathic medicine which work against the PCOS mechanism.

A review of the literature showed that plants such as aloe vera and chamomile improve fertility by increasing the number of ovarian follicles. Besides, Vitex agnus-castus and octane reduce hirsutism by reducing testosterone and androgen levels. It was also shown that liquorice, ginseng, cinnamon, and D-chiro-inositol improve the adverse effects of diabetes caused by PCOS by lowering lipid and blood glucose levels. Moreover, Stachys lavandulifolia and fennel are effective in changing endometrial tissue parameters in PCOS by reducing estrogen and hyperplasia.

Various studies have shown that herbal medicines can improve PCOS symptoms in women with minimal side effects but longer treatment cycles are required. Bariatric surgery is the most effective approach for weight loss. It attenuates PCOS's associated clinical symptoms, such as menstrual irregularity, hirsutism, and, possibly, infertility. It can also improve comorbidities as type 2 diabetes mellitus, hypertension, and dyslipidemia, and lower the risk of preeclampsia, gestational diabetes, and birth of large-for-gestational-age offspring in the bariatric population.

This procedure has also been associated with shorter gestation length, increased risk of birth of small-for-gestational-age offspring, and an increase in perinatal mortality. The international guidelines suggest that, for the purpose of improving fertility and pregnancy outcomes, bariatric surgery should be considered as an experimental therapy in women with PCOS. Moreover, bariatric surgery could be considered in women with PCOS, who have a BMI $\geq$35 kg/m^2.

Keywords: Allopathic medicine, Endometrial tissue, Male hormones, Polycystic ovary syndrome

The Role of Synchronization of Embryo and Endometrium in Successful Implantation

Marefat Ghaffari Novin

Shahid Beheshti University of Medical Sciences, Tehran, Iran

Abstract

Three pre-requisite factors for successful implantation are achieving an embryo with implantation competence, a receptive endometrium, and a synchronized development of the embryo and the endometrium. Uterine receptivity refers to the condition of the uterus where the endometrium is available to accept the embryo for implantation.

The main causes of implantation failures have been noted: (1) embryo developmental defects, e.g. chromosomal anomalies; (2) endometrial developmental defects, e.g. luteal phase deficiency and reduced endometrial receptivity; and (3) embryo-endometrial developmental asynchrony.

Human implantation rates are reduced as asynchrony between the embryo and the endometrium increases. Evidence suggests that the human embryo implantation rate is significantly reduced when asynchrony between the embryo and the endometrium is greater than ±1.5 days.

Controlled ovarian hyperstimulation (COH) has a detrimental effect on uterine receptivity. In stimulated cycles, advanced endometrial development with premature secretory changes is commonly observed on the day of oocyte retrieval. Abnormal endometrial development with significant discordant stromal maturation was observed 2 days after oocyte retrieval in up to 91% of women undergoing ovarian hyperstimulation for IVF. Dyssynchronous glandular and stromal differentiation were also commonly seen in mid-luteal phase endometrium after ovarian hyperstimulation.

Various modalities have been established for assessing uterine receptivity in an IVF cycle with COH. Potential modalities that can be used to predict uterine receptivity prior to embryo transfer include ultrasound assessment of endometrium, serum progesterone levels, and genomic or proteomic assessment of uterine cells/ fluid. Other assessments of uterine receptivity that can be offered in a cycle prior to an embryo transfer include traditional histologic dating and endometrial gene expression assays.

Ovarian stimulation used in fresh cycles causes the problem by either impairing embryo-endometrial synchrony or promoting pathological endometrial development, leading to suboptimal implantation and ultimately resulting in low birth weight with ART. Therefore, some IVF programmes now promote a freeze-all strategy to try and improve birth outcomes from IVF pregnancies. In addition, there is an unmet need for improved precision in the evaluation of endometrial development to permit better synchronization of the embryo and the endometrium prior to implantation.

Keywords: Controlled ovarian hyperstimulation, Endometrial receptivity, Histologic testing, Ovarian stimulation

Outcome of Pregnancy in Poor Ovarian Responders by Intraovarian Administration of Autologous Menstrual Blood Derived Mesenchymal Stromal Cells

Simin Zafardoust

Avicenna Fertility Center, ACECR, Tehran, Iran

Abstract

Background: Poor ovarian response (POR) poses a great challenge where the number of oocytes collected with the appropriate ovarian stimulation is usually below expectation. In addition to that, the efficacy of stem cell therapy in the resumption of ovarian function, improvement in FSH, E2, ovarian weight, follicle count, improvement of ovarian function, and pregnancy rates have been reported by bone marrow (BM) stem cell infusion in POR women. Stem cells have the potential for the treatment of disorders, such as menstrual blood derived mesenchymal stromal cells (Men-MSCs). The aim of this study was to survey the outcome of pregnancy in poor ovarian responders by intraovarian administration of autologous menstrual blood derived mesenchymal stromal cells.

Methods: In this study, 180 infertile couples with a history of at least 1 standard previous IVF-ET or ICSI-ET, history of less than 4 retrieved oocytes, and AMH <1 were included in the study. Total women were divided into MSC therapy (n =90) and control groups (routine ICSI plan, n =90). Women in the control group were followed for spontaneous pregnancy up to 3 to 4 months after the last ovarian stimulation for ICSI. In the MSC therapy group, menstrual blood was collected from women using a sterile Diva cup on the second day of menstruation. After 1 to 2 months, stem cells were injected into the ovaries of patients after receiving general anesthesia with midazolam and fentanyl using transvaginal sonography (TVS). Spontaneous pregnancy in patients three to four months after injection was evaluated. In both groups, patients who did not get pregnant during this period entered the ICSI cycle.

Results: In total, 180 women were included in the study and divided into MSC therapy (n=90) and control groups (routine ICSI plan, n=90). In both groups, they were divided into ≤40 years and >40 years groups. It was found that 12 (27.3%) patients in the MSC group and 2 (4.5%) in the control group (≤40-year-old subjects) had spontaneous pregnancy within 3 to 4 months (p=0.003). Moreover, 29 MSC patients under 40 years and 42 controls (under 40 years) entered the ICSI cycle; also, 8 people (27.6%) in the MSC group and 2 people in the control group (4.8%) got pregnant after ICSI (p=0.009). Furthermore, 6 (13.6%) patients in the MSC group (over 40 years) and 2 (5.1%) in the control group (over 40 years) had spontaneous pregnancy within 3 to 4 months (p=0.175). Also, 33 MSC patients (over 40 years) and 36 controls (over 40 years) entered the ICSI cycle, and 0 people (0%) in the MSC group and 2 people in the control group (5.6%) got pregnant (p=0.26). Finally, 5 patients (13.5%) in the MSC group and 2 patients (5.4%) in the control group reached the stage of delivery (p=0.215).

Conclusion: Cell therapy in POR women, especially in women ≤40 years, considerably increases oocyte number and quality, embryo quality, fertilization rate, pregnancy rate especially spontaneous pregnancy rate, and live birth rate.

Keywords: Cell therapy, Menstrual blood derived- mesenchymal stromal cells, Poor ovarian response, Spontaneous pregnancy

A Proposed Approach for Personalized Medicine Based on the Analysis of Seminal Plasma Metabolomics (Amino Acids) Following Untargeted Antioxidant Treatment in Patients with Asthenozoospermia

Mahshid Bazrafkan

Avicenna Research Institute, Tehran, Iran

Abstract

In spermatozoa, mitochondria perform aerobic metabolism and produce reactive oxygen species (ROS). It is detrimental to sperm functions when ROS production exceeds the antioxidant capacity of cells. Based on WHO (2010) fifth edition manual, asthenozoospermia is defined in cases with normal morphology >4%, count >15×106/ml, and motility <32%. ROS negatively affects sperm motility, one of the most important sperm functions. Among the latest trends for treating patients with high ROS levels and improving sperm motility is the use of oral antioxidants. The amino acids profile of seminal plasma could be altered by random antioxidant therapy in cases with asthenozoospermia, and any antioxidant therapy prescribed should be individualized based on each patient's seminal plasma profile. The purpose of the current study was to determine the amino acid profile of seminal plasma of patients with asthenozoospermia after untargeted antioxidant therapy.

Patients with asthenozoospermia (n = 51) were collected after 3 - 5 days of abstinence. Routine antioxidant supplementation (Vitamin E 400 IU/day + Selenium 60 mg/day + Folic acid 5 mg/day) was prescribed daily for 3 months.

Semen analysis was done before and after antioxidant therapy. A quantitative analysis of amino acids was conducted before and after supplementation. In our study, MetaboAnalyst software was utilized for metabolomics investigations. Volcano plots showed notable decreases in 12 amino acids after antioxidant treatment. In addition to hydroxyproline, which must be present in normal semen, the most significant decrease was seen in beta-aminoisobutyric and L-tryptophan as improvers of sperm motility. Interestingly, after antioxidant treatment, only sperm count increased (163 × 106 ± 9) compared with the pre-treatment group (104 × 106 ± 6) but not sperm motility. Aside from that, the enrichment analysis information indicates that the urea cycle, ammonia recycling, and aspartate metabolism are the most prevalent cycles in people with asthenozoospermia. Sperm count and motility are negatively correlated with the urea cycle and ammonia recycling in infertile men, according to the literature. According to our results, suppression of the urea cycle was the most important factor that caused sperm count to increase after treatment, but no effect was found on ammonia recycling to improve sperm motility, which was different from our expectation. Therefore, any antioxidant treatment prescribed should be based on individual human seminal plasma profiles and metabolomics pathways to achieve the desired results.

Among the main limitations of this study are the exact selection of patients and the inclusion of only patients with pure asthenozoospermia. To improve sperm quality and male fertility, discovering the exact causes in eacg affected serum parameter and metabolomics of normal sperm and seminal plasma is crucial to optimize personalized medicine.

Keywords: Asthenozoospermia, Male fertility, Metabolomics pathways, Personalized medicine, Sperm quality

The Effects of Selenium Supplementation on Glycemic Control, Serum Lipoproteins, and Biomarkers of Oxidative Stress in Infertile Women Diagnosed with Polycystic Ovary Syndrome Undergoing In Vitro Fertilization: A Randomized, Double-Blind, Placebo-Controlled Trial

Shahrzad Zadeh Modarres [1], Zatollah Asemi [2], Zahra Heidar [1]

1. Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Research Center for Biochemistry and Nutrition in Metabolic Diseases, Kashan University of Medical Sciences, Kashan, Iran

Abstract

Objective: The purpose of the current study was to evaluate the effects of selenium consumption on metabolic profile among infertile females diagnosed with polycystic ovary syndrome (PCOS).

Materials and Methods: The current randomized, double-blind, placebo-controlled trial was conducted among 40 infertile females with PCOS aged between 18 and 40 years. Patients were randomly allocated to two groups of intervention to receive selenium supplements (200 µg/day) or placebo (starch). Fasting blood samples were taken at baseline and after 8 weeks of intervention.

Results: Selenium administration significantly decreased fasting glucose (p=0.03), the value of homeostasis model assessment (HOMA) for insulin resistance (p=0.007), fasting insulin levels (p=0.006), and elevated quantitative insulin sensitivity check index (QUICKI) (p<0.001). In addition, selenium supplementation significantly reduced malondialdehyde (MDA) levels (p=0.006). No significant effect of selenium supplementation was found on pregnancy rate, lipid profiles, total antioxidant capacity (TAC), and total glutathione (GSH) levels.

Conclusion: Overall, our study demonstrated that selenium supplementation for 8 weeks in infertile women with polycystic ovary syndrome (PCOS) undergoing IVF had beneficial effects on glycemic control and MDA levels, but did not affect pregnancy rate, lipid profiles, TAC, and GSH levels.

Keywords: Glycemic control, In vitro fertilization, Polycystic ovary syndrome, Selenium, Total antioxidant capacity

Poster Presentations

The Effect of Lepidium Meyenii on Viability, Motility, and Sperm Morphology in Treatment of Infertility Among Adult Male Wistar Rats

Arefeh Sabzipour [1], Maryam Bananej [1], Alireza Heidarnejad [2]

1. Department of Biology, Faculty of Biological Sciences, North Tehran Branch, Islamic Azad University, Tehran, Iran
2. Department of Embryology and Andrology, Avicenna Research Institute, ACECR, Tehran, Iran

Abstract

In the present work, the effect of Lepidium meyenii on viability, motility, and sperm morphology in the treatment of infertility of adult male Wistar rats was evaluated. For this purpose, 21 male Wistar rats were adopted, raised, and fed until they reached the weight of 230±5 g; next, they were randomly divided into three groups including two experimental groups and one control group and each group consisted of 7 rates. Lepidium meyenii was extracted and pulverized. Mice in the control group were treated with distilled water and experimental groups were gavaged with methanol extracts of Lepidium meyenii once a day for 10 consecutive days. After killing the rats, the testes were isolated. Different parameters including semen volume, sperm count, sperm motility, morphology, and viability were evaluated.

The results show that sperm count and sperm survival indices were significantly different between groups and sperm motility and sperm morphology indices were not significantly different. Sperm motility index in intervention group one was equal to 77.00±2.499 and was significantly higher than the one in intervention group two (70.14±3.579, p=0.018) and control group (69.43±7.323, p=0.018). Sperm survival index was 91.14±2.410 in intervention group one, 79.43±5.062 in intervention group two, and 76.71.6.651 in control group (p<0.001). Based on the results of the present study, Lepidium meyenii had great effect on improving sperm indices of mice, especially sperm motility index and sperm survival index. Sperm count index and sperm morphology index, although increased, were not statistically significant.

Keywords: Infertility, Lepidium meyenii, Sperm morphology, Sperm survival

Infertility and Sexual Function in Men

Nafiseh Shams Nateri

Alborz University of Medical Sciences, Karaj, Iran

Abstract

Background: Infertility has been defined by the World Health Organization (WHO) as a public health problem and about half of couples are infertile due to male factors. The findings about the association between sexual dysfunction and male infertility were controversial and few studies investigated them. The purpose of the current study was evaluation and review of the role of male infertility in sexual dysfunction and determining which domains of sexual functions are more affected by infertility.

Methods: A systematic search of the target literature was done and 25 articles published during 2005-2022 in Iran and other countries were evaluated using keywords like sexual dysfunction, International Index of Erectile Function (IIEF), male infertility, and infertility that all of them included level 1 evidence. Also, this study was conducted using PubMed, EMBASE, and Cochrane Library. Data were analyzed to assess the relationship between sexual dysfunction and male infertility and odds ratio (OR) was calculated to investigate the morbidity in infertility group and fertility group.

Results: There was no significant association between infertility factor and the mean score of sexual functioning. Among the aspects of sexual functioning, only the mean score of lubrication in the group of male factors was significantly higher than the common factors for men and women ($p = 0.07$). There was also no significant relation between infertility factor and the mean score of adherence to treatment ($p > 0.05$). There was a linear positive relation between sexual functioning ($r = 0.189$) and adherence to treatment ($r = 0.146$) in infertile women.

Conclusion: The results of this study show that men in infertile group were found with higher prevalence of sexual dysfunction and lower IIEF values in comparison to controls. The most affected sexual function domains were erectile function, orgasm, and sexual desire domains. Other studies reported on the influence of erectile dysfunction, premature ejaculation, hypoactive sexual desire disorder, and satisfaction impairment. In one study, the most important domain was orgasm.

Keywords: Female factors, Infertility, Male factors, Sexual dysfunction

Effectiveness of Intra-Ovarian Platelet-Rich Plasma (PRP) Injection for Treatment of Primary Ovarian Insufficiency (POI)

Tahereh Rezazadeh [1], Fatemeh Tanhaye Kalate Sabz [2], Tooba Farazmand [3]

1. Department of Biology, East Tehran Branch, Islamic Azad University, Tehran, Iran
2. Department of Anatomical Sciences and Pathology, School of Medicine, North Khorasan University of Medical Sciences, Bojnurd, Iran
3. Department of Surgery, School of Medicine, North Khorasan University of Medical Sciences, Bojnurd, Iran

Abstract

Introduction: Approximately 1% of women of reproductive age suffer from primary ovarian insufficiency (POI), characterized by a significant reduction in ovarian reserves before age 40, menstrual irregularity, or amenorrhea. Usually, POI patients receive hormone replacement therapy; however, their reproductive capability has already diminished. The return of reproductive ability of POI patients is one of the critical issues that has been assessed. Researchers have investigated some approaches, including mesenchymal stem cells and platelet-rich plasma (PRP). PRP as autologous injection therapy has been proposed for ovarian regeneration in POI patients.

Method: The terms "PRP and ovary" were searched in PubMed, Science Direct, and Google Scholar and articles were reviewed.

Results: PRP contains a high concentration of hormones, chemoattractants, and cytokines. There is evidence that PRP, due to its high growth factor concentration, can be helpful in regenerative medicine and it stimulates cell proliferation and tissue differentiation. Researchers have investigated PRP's effectiveness in treating nerve injury, myocardial infarction, cosmetic surgery, etc.; also, many studies have shown that PRP benefits women with thin endometrium, and recurrent implantation failure (RIF). Intra-ovarian injection of PRP has been used recently to treat POI patients. Some studies showed that PRP could help delay follicular atresia and reduce oocyte degeneration. Researchers reported that in some patients, menstruation was restored, and AMH, FSH, and AFC levels were improved. PRP may help activate dormant ovarian follicles for pre-IVF treatment, and in some patients, spontaneous pregnancy was also achieved.

Conclusion: According to the results of the various research, it can be stated that the intra-ovarian injection of PRP can be a promising option for women in early menopause or in POI cases. But there is little scientific evidence to support its effectiveness, and more research is needed.

Keywords: Intra-ovarian injection, IVF treatment, Platelet-rich plasma (PRP), Primary ovarian insufficiency (POI), Recurrent implantation failure (RIF)

Treatment Approach of Metabolic Disorders and Infertility in Cases with Polycystic Ovary Syndrome

Arezoo Solati[1], Sanaz Alaee Jahromi[1], Shayesteh Mehdinejadiani[1], Zahra Khodabandeh[2]

1. Department of Reproductive Biology, School of Advanced Medical Sciences and Technologies, Shiraz University of Medical Sciences, Shiraz, Iran
2. Stem Cells Technology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

Abstract

Introduction: The most common cause of female endocrine-related reproductive disorder is polycystic ovary syndrome (PCOS) characterized by increased ovarian androgen biosynthesis, anovulation, and infertility and it demonstrates a high heterogeneity and complexity. Also, an increase in the plasma level of insulin, especially in overweight/obese women or in people with familial diabetes, is another characteristic of this disease. The cause of infertility in one third of couples who are referred to infertility clinics is lack of ovulation, which is associated with a decrease in pregnancy rate.

Methods: In this review, PubMed, Scopus, and Google Scholar were searched for the studies published from 2015 to 2022 with keywords of PCOS, metabolic syndrome, female fertility, and PCOS treatment. The search and data extraction were conducted by two researchers.

Results: Lifestyle changes and weight loss are the first and most effective treatments for PCOS. The use of oral contraceptives is effective in reducing acne, hirsutism, and regulating the menstrual cycle. Clomiphene citrate and letrozole are the first drugs of choice, followed by low-dose gonadotropin in cases of anovulatory infertility. Recently, insulin sensitizing drugs, which are effective in reducing insulin resistance and improving ovulatory function, have been widely prescribed for PCOS patients. Also, in vitro maturation (IVM) treatment for PCOS patients may be a valid alternative to IVF with the advantage of eliminating the risk of ovarian hyperstimulation syndrome (OHSS) and reducing drug costs.

Conclusion: Metabolic syndrome, as one of the important complications of PCOS, has a negative effect on women's fertility, and this indicates an adverse effect on the stimulation characteristics of the in vitro fertilization cycle and clinical results.

Keywords: Female fertility, In vitro maturation (IVM), Metabolic syndrome, PCOS treatment, PCOS

The Effect of Saponin-Ferritin Nanoparticles on Uterine Changes in Infection of Female NMRI Mice with *Streptococcus Pneumoniae*

Saba Safdarpour [1], Zohreh Eftekhari [2], Akram Eidi [1]

1. Department of Biology, Science and Research Branch, Islamic Azad University, Tehran, Iran
2. Quality Control Department, Research and Production Complex, Pasteur Institute of Iran, Alborz, Iran

Abstract

Background: Saponin via anti-inflammatory properties positively affects uterine conditions for pregnancy. The purpose of the current study was to establish *Streptococcus pneumoniae* as an infection model in female NMRI mice to evaluate its effects on the number of fetuses, and histopathological changes of the uterus in the pregnant mice.

Methods: In the present study, 50 NMRI mice were divided into 3 groups of control, *Streptococcus pneumonia* inoculated group, and treatment group receiving saponin-ferritin nanoparticles. Real-time PCR and hematoxylin-eosin staining were used to assess heparin-binding EGF-like growth factor (HB-EGF) gene expression and changes in uterine tissue, respectively.

Results: HB-EGF gene expression in the group treated via nano-saponin showed a statistically significant increase compared to the pneumonia group ($p<0.001$). Based on the histopathological evaluations in the two study groups, it was found that the thickness of the endometrial layer of uterine tissue in the nano-saponin group increased compared to the pneumonia group, so that thickness of stratified cuboidal epithelium with enhancement in the number of cells were observed. On the other hand, endometrial layer vascularization increased in this group compared to the pneumonia group. The images showed that the thickness of the uterine myometrium increased more than the one in the pneumonia group. In total, the thickness of the endometrial layer and myometrial layer in the nano-saponin group was twice that of the one in pneumonia group.

Conclusion: Saponin encapsulated with ferritin nanoparticles not only improves the uterus capacity for fertility by increasing the thickness of the endometrium and the number of embryos but also proves to be effective in creating the proper conditions for a successful pregnancy due to bacterial infection.

Keywords: Animal model, Ferritin nanoparticles, Saponin, Streptococcus pneumonia, Uterine

Endometriosis Treatment Based on miRNAs

Leila Kooshesh

Department of Genetics, Fars Academic Center for Education, Culture and Research, ACECR, Shiraz, Iran

Abstract

Background: Epigenetic modifications are connected with endometriosis pathomechanisms. Some specific miRNAs as epigenetic key factors can develop endometriosis through modulating cell cycle progression, apoptosis, proliferation, endometriotic cell migration, steroidogenic pathway, hormone signaling, inflammation, and progesterone resistance. Numerous studies have demonstrated that over 50 up- or down-regulated miRNAs expressions (such as, miR-200 family, miR-20a, miR-143, 145, miR199a, and let-7) are altered in endometrium tissues in women with endometriosis, compared to healthy women, which dysregulate expression of several target mRNAs relevant to the pathogenesis of the disease.

Detection of these miRNAs as epigenetic gene expression determinants in etiopathogenesis of endometriosis and their dynamic and reversible nature have developed a new chapter in the use of miRNAs as endometriosis targeted diagnostic, prognostic, and therapeutic strategies. Some recent epigenetic therapies for controlling endometriosis with emphasis on miRNAs are discussed here.

Up-regulation of MiR-370-3p as a negative regulator of steroidogenic factor-1 (SF-1) could cause cell proliferation inhibition and apoptosis stimulation in endometriotic lesions. Also, down-regulation of miRNA-125b-5p and up-regulation of let-7b-5p could regulate macrophage-mediated inflammation through reduction of production of proinflammatory cytokines and decrease inflammation in patients with endometriosis. In addition, modulating MiR-194-3p and miR-29c regulation could decrease progesterone resistance in endometriosis, resulting in increased endometrial receptivity and decreased risk of implantation failure. Finally, modulating miR-200 family that are involved in cell migration and the epithelial–mesenchymal transition could be considered as a new strategy for controlling endometriosis.

Method: In this literature review, publications available in PubMed and Scopus, as well as Google Scholar were taken into account. Eligibility criteria included studies related to the development of new therapies based on miRNAs in endometriosis.

Conclusion: Medication targeting some specific miRNAs responsible for the aberrant gene expression pattern in endometriotic lesion can be a new effective strategy for the treatment of endometriosis.

Keywords: Endometriosis, Epigenetic key factors, Epigenetic modifications, miRNAs

The Effect of Malva Neglecta Extract on Infertility Induced by Cadmium Chloride in Wistar Rats

Fatemeh Sadrforati, Pejman Mortazavi, Mohammad Amin Eslampour

Islamic Azad University Science and Research Branch, Tehran, Iran

Abstract

Introduction: Malva neglecta extract has bioactive phytochemicals which can protect DNA against damage of reactive oxygen species (ROS). Cadmium acts as a toxin which affects reproductive system and destroys the process of spermatogenesis. Destructive function of cadmium metal increases the level of free radicals and induces oxidative stress. This study was carried out to examine the protective effect of hydroalcoholic extract of Malva neglecta on infertility induced by cadmium chloride in adult male Wistar rats.

Materials and Methods: In this study, 40 male Wistar rats were randomly allocated into eight groups: the control, Cd, TOE extract (100, 200, and 400 mg/kg/body weight) and chloride cadmium-Malva neglecta (100, 200, and 400 mg/kg/body weight). Rats were gavaged with Malva neglecta extract once daily for 28 days. Serum levels of MDA and SOD were measured. Motility, viability, and total count of sperm were measured. Testis histopathology for investigation of Johnson score was done.

Result: The results show that the number of spermatogonia, spermatocytes, and spermatids have been significantly reduced in cadmium chloride group compared to those in control group ($P<0.05$). However, compared to the cadmium chloride group, the chloride cadmium- Malva neglecta extract group showed an increase in the number of cells. Motility value ($p<0.05$) and dead sperm rate ($p<0.001$) were respectively increased and decreased in dandelion treatment group compared with cadmium chloride group. Serum levels of SOD and MDA were respectively increased and decreased in cadmium chloride - Malva neglecta group compared with other groups ($p<0.01$).

Conclusion: Our results indicate that Malva neglecta extract has protective effect on testis probably by scavenging free radicals and reducing toxicity caused by oxidative stress.

Keywords: Cadmium chloride, Malva neglecta, Oxidative stress, Toxicity, Wistar rats

Gestational Trophoblastic Disease After Twin Pregnancy with Complete Hydatidiform Mole Co-existing with Normal Live Fetus Following Assisted Reproductive Techniques: A Case Report

Maryam Hashemi, Hatav Ghasemi Tehrani

Department of Obstetrics and Gynecology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

Abstract

Background: Complete hydatidiform mole coexisting with a viable live fetus is an extremely rare phenomenon, occurring in approximately 1/22,000–1/100,000 pregnancies worldwide. Due to the worldwide increase in the use of ART, the incidence of this complex obstetric complication is likely to increase in the future.

Case report: Herein, a 44-year-old gravida 2 abortion 1 is reported who presented at 14 weeks of gestation to the emergency labor ward at Alzahra Hospital with severe pre-eclampsia and dyspnea. Her obstetric history was notable for a spontaneous abortion 4 years earlier and now she has been pregnant via IVF. She was anemic (Hb 7.8gm/dl) and hypertensive with a blood pressure of 150/100 mmHg. An ultrasound demonstrated a 14 week single live intra-uterine pregnancy. In addition, a large hydatidiform mole was noted and subsequent β-HCG measurement was more than 150,000 IU/ml. The patient was counseled about maternal and fetal risks of continuing the pregnancy, most notably the risk of developing eclampsia. Termination of pregnancy was scheduled for her by 50 units of oxytocin in 500cc N/S. During induction, she revealed severe pulmonary edema and then she was transferred to the ICU. Severe vaginal bleeding was happened and she was transferred to the operating room. Suction curettage was performed and a lot of vesicles and hydatidiform mole were evacuated, then a normal fetus and placenta were delivered completely without any intervention. Portable sonography of uterus was done during curettage. There was no product of conception. She received 2 units of packed red blood cells (RBC). Pathology report confirmed complete mole hydatidiform. In her follow-up, she showed gestational trophoblastic neoplasia (GTN) and received 6 courses of actinomycin-D. Then, her β-HCG was 4 IU/L but the test should be performed for 2 weeks in order to reveal undetectable level.

Conclusion: This study highlights the need for follow-up of patients and their referral to professional centers capable of managing high-risk pregnancies. Patients should also be informed of the high risk of GTN, independently of gestational age when the pregnancy ended, and thus the need for long-term follow-up by oncologist teams.

Keywords: Actinomycin-D, Complete hydatidiform mole, Gestational trophoblastic disease, β-HCG measurement