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Placenta Accreta Spectrum: A Paradigm Shift in Surgical Treatment

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Placena accreta is one of the most severe complications of pregnancy. It may result in massive hemorrhage, DIC, shock, organ damage and even maternal death. The most accepted treatment is cesarean hysterectomy without placenta removal. However, this approach demands a high surgical expertise. Despite that, a high surgical morbidity still occurs. Besides, the complications included permanent loss of fertility, increased metabolic long-term consequence. Therefore, expectant management (suture the uterine incision with placenta left in-situ, waiting for spontaneous placenta reabsorption) was advocated. Nonetheless, several complications such as immediate and delayed hemorrhage, DIC, thromboembolism, secondary hysterectomy have reported. Therefore, how to balance the risk and complications between extirpative and conservative approaches is still challenging.

We first advocated the Nausicaä suture in 2014, followed by published our case series in 2018 at British Journal of Obstetrics and Gynecology. Our series consisted of 68 patients with major postpartum hemorrhage, included 36 placenta previa totalis with placenta accreta spectrum (PAS) (26 cases of placenta creta, 7 cases of placenta increta, and 3 cases of placenta percreta), PAS over the posterior or fundal wall (n = 7), placenta previa totalis without PAS (n = 20), and uterine atony (n = 5). Currently we have finished more than 188 patients of Nausicaä sutures, mainly for different extents and territory of PAS. In contrast to the extirpative and conservative management of PAS, the invent of Nausicaä suture is "walking in the middle way" to avoid the risks and complications two extremes of management. Besides, the rules of "no hysterectomy" and "no placenta separation" were also revisited.

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產前全基因檢測的分析諮詢原則

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Prenatal fetal whole genome sequencing (WGS) is an essential preventive screening method. In the past, prenatal screening primarily involved traditional karyotyping, which had the limitation of only detecting numerical and large-segment chromosomal changes. Later, chromosomal microarray analysis (CMA) was developed, allowing for more refined detection of chromosomal variations, as many of these subtle changes are associated with congenital disorders. Now, next-generation sequencing (NGS) technology can decode the entire genetic code and further analyze its variations.

NGS includes whole exome sequencing (WES), which can mainly detect genetic variations within 1 to 100 DNA bases. However, whole genome sequencing (WGS) provides a more comprehensive analysis by sequencing all 3 billion DNA bases in a continuous manner. Coupled with bioinformatics analysis, this technology not only identifies genetic mutations but also integrates the largest genomic database (ClinVar) for evidence-based interpretation. Additionally, WGS allows for a more precise analysis of chromosomal microvariations, such as copy number variations (CNVs) and structural variants (SVs).

Compared to traditional chromosomal microarrays, WGS offers higher resolution and may become the most comprehensive prenatal genetic analysis tool in the future. However, WGS analysis is significantly more complex. Accurately analyzing this data remains a challenge for obstetricians, particularly in explaining the findings to patients in a comprehensible way and conveying their actual health implications.

This lecture and research paper will provide relevant guidelines and principles to enhance the expertise and application of prenatal genetic testing among physicians. It aims to strengthen the professionalism and accuracy of related medical plans while equipping healthcare professionals with practical experience to improve the efficiency of prenatal genetic screening.

Keywords: whole genome sequencing, bioinformatics, genomic counseling

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子宮動脈血流在 small-for-gestational-age (SGA)評估與預防的角色

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The combined presentation offers a comprehensive overview of uterine artery Doppler ultrasonography and its role in predicting adverse pregnancy outcomes of small-for-gestational-age (SGA) infants. It covers the following:

1.Clinical Applications of Uterine Artery Doppler:

- Doppler ultrasound of uterine artery in assessing placental function and blood flow dynamics.
- Diagnostic utility in identifying preeclampsia, gestational hypertension, and preterm birth risks.

2.Fetal Growth Restriction (FGR) Diagnosis and Management:

- Definition and differentiation of FGR and SGA.
- Insights into the pathophysiology of suboptimal utero-placental perfusion and its long-term health implications.
- Management strategies, including timely delivery decisions and fetal surveillance techniques like Doppler velocimetry.

3.Prediction of SGA in Twin Pregnancies:

- Evaluation of second-trimester uterine artery Doppler as a screening tool for twin pregnancies.
- Comparison of Doppler indices in monochorionic and dichorionic twins.
- Limitations and potential improvements through maternal demographic and biometric integration.

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Artificial Intelligence and Obstetrics

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Artificial Intelligence (AI) is based on principles that aim to replicate and implement human intelligence functions, such as learning, reasoning, planning, and perception. Its operation is fundamentally based on data, including both structured data (e.g., tabular data) and unstructured data (e.g., images, speech, and text). The performance of AI improves with the quantity and quality of the data available.

AI models are trained to learn patterns and make predictions through different methods, include supervised learning, unsupervised learning, reinforcement Learning, and self-supervised learning. AI models are algorithms developed based on these methodologies, with commonly used models such as Random Forests, Support Vector Machines (SVM), and Artificial Neural Networks (ANN). Additionally, AI can continuously learn and update itself to adapt to dynamic data and evolving demands.

In the field of healthcare, AI has been widely applied in areas such as disease diagnosis, image-aided diagnostics, pathological analysis, early disease screening, drug response prediction, health risk assessments, and pharmaceutical research and development. In obstetrics, AI can play a crucial role in risk assessment and monitoring during pregnancy, including predicting complications and providing ongoing surveillance. It is also instrumental in ultrasound image analysis, enabling automated diagnosis, the identification of standard planes, and automated fetal biometric measurements. Moreover, AI facilitates genetic diagnostics, such as analyzing fetal chromosomal abnormalities and performing large-scale analyses by integrating global or regional obstetric data. During labor and delivery, AI contributes to risk prediction, fetal monitoring, and decision-making support.

This session will briefly introduce AI and explore its applications in obstetrics.

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人工智慧在產科超音波的最新應用

In the field of obstetric ultrasound, advancements in artificial intelligence (AI) are revolutionizing diagnostic techniques. With the rapid development of AI technologies, particularly in deep learning and convolutional neural networks (CNNs), the accuracy and efficiency of obstetric ultrasound have significantly improved.

Recent studies indicate that AI can automatically analyze ultrasound images to identify fetal anatomical structures and potential abnormalities, a task that previously required experienced clinicians to perform manually. By training AI models on large datasets of ultrasound images, researchers are enhancing the accuracy of these models, enabling early detection of congenital malformations, which is crucial for improving maternal and fetal health.

Moreover, the application of AI can reduce interobserver variability, meaning that different clinicians interpreting the same image will achieve greater consistency in their results. This is particularly important in clinical practice, as it ensures that all pregnant women receive the same level of care and diagnosis.

Future research directions include exploring the optimal AI techniques for use in obstetric ultrasound and assessing whether these technologies can improve maternal and fetal health outcomes. Researchers are also looking into how to integrate AI technologies into existing clinical workflows so that healthcare professionals can utilize these tools more effectively.

Overall, the application of AI in obstetric ultrasound not only enhances diagnostic accuracy and efficiency but also provides a broad scope for future research, signaling a new era in obstetric medicine. As technology advances, AI has the potential to become an indispensable tool in obstetric ultrasound diagnostics, further improving overall maternal and fetal health outcomes.